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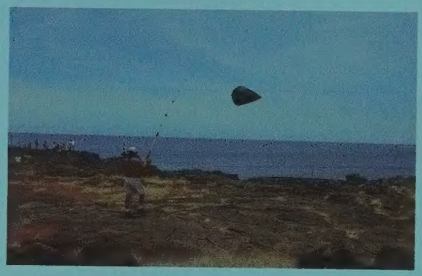
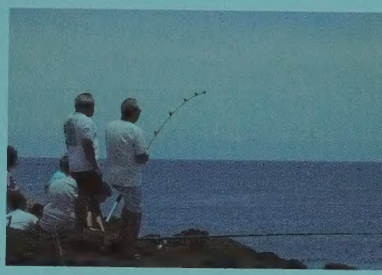
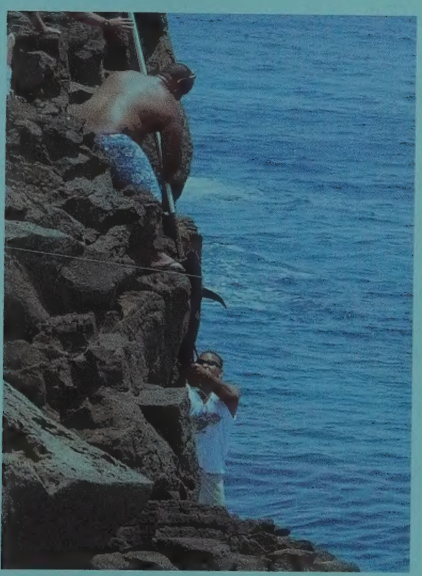
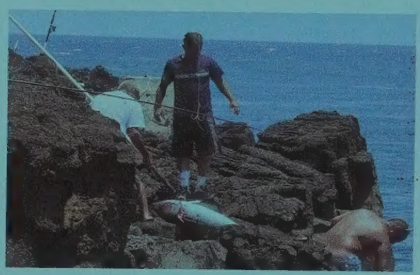

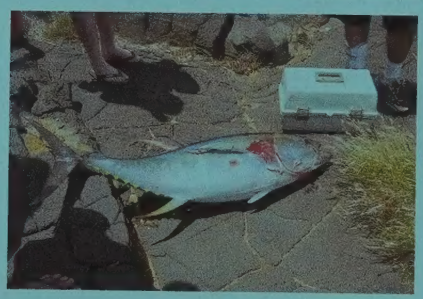

2002 Annual Report

Cover Photos:

At the Southern most point of the United States (South Point on the island of Hawaii), fishermen line the cliffs for an innovative fishing technique. The consistently strong winds at South Point allow fishermen to use creative methods, including using bags as kites, to pull their lines out into deep water. This technique allows fishermen to catch pelagic species not normally available to them from shore. Here, local Hilo fisherman, Ken Nakao, gets some action using a 9-0 rig with an 80-lb test and 200 foot leader. After fighting the fish for over an hour, the fish is hauled up the cliffs, and the hook is removed. His catch: A 61-lb Yellowfin Tuna (*Ahi*).

December 2003
Honolulu, Hawaii

A report of the Western Pacific Regional Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA77FC0008

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Pelagic Fisheries of the Western Pacific Region

2002 Annual Report

Printed on February 18, 2004

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Prepared by the Pelagics Plan Team and Council Staff

for the

Western Pacific Regional Fishery Management Council
1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813

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Pelagic Fisheries of the Western Pacific Region — 2002 Annual Report

I. Introduction

A. Background

The Fishery Management Plan (FMP) for Pelagic Fisheries of the Western Pacific Region was implemented by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) on 23 March 1987. The Western Pacific Regional Fishery Management Council (WPRFMC, or Council) developed the FMP to manage the pelagic resources that are covered by the Magnuson Fishery Conservation and Management Act of 1976 and that occur in the US Exclusive Economic Zone (EEZ) around American Samoa, Guam, Hawaii, the Northern Mariana Islands, and the US possessions in the Western Pacific Region (Johnston Atoll, Kingman Reef and Palmyra, Jarvis, Howland, Baker, Midway, and Wake Islands).

The objectives of the Pelagics FMP were revised in 1991. The abridged objectives are to:

- Manage fisheries for Pacific pelagic management unit species (PPMUS) to achieve optimum yield (OY).
- Promote domestic harvest of and domestic fishery values associated with PPMUS[1] (e.g., by enhancing the opportunities for satisfying recreational fishing experience, continuation of traditional fishing practices and domestic commercial fishers to engage in profitable operations).
- Diminish gear conflicts in the EEZ, particularly in areas of concentrated domestic fishing. Improve the statistical base for conducting better stock assessments and fishery evaluations.
- Promote the formation of regional/international arrangements for assessing and conserving PPMUS throughout their range.
- Preclude waste of PPMUS associated with longline, purse seine, pole-and-line or other fishing operations.
- Promote domestic marketing of PPMUS in American Samoa, Guam, Hawaii and the Northern Mariana Islands.

Non-tuna PPMUS are sometimes referred to as "other PPMUS" in this report. This term is equivalent to PMUS (Pelagic Management Unit Species) used in annual reports previous to 1992, before tunas were included in the management unit.

---

[1] The Magnuson Act was amended to allow the inclusion of tunas in US fishery management authority as of January 1992. In the Pacific, tuna management is the responsibility of the regional fishery management councils. Pacific pelagic management unit species (PPMUS) includes former pelagic management unit species (PMUS) and tunas.

The PPMUS are caught in the troll, longline, handline and pole-and-line (baitboat) fisheries. They are caught in oceanic as well as insular pelagic waters. Most of these species are considered to be epipelagic because they occupy the uppermost layers of the pelagic zone. All are high-level predators in the trophic sense. Pelagic fisheries for PPMUS are among the most important, if not the dominant Pacific Island fisheries.

B. Report Content

This report contains fishery performance data from each of the four island groups through 2001, interpretations of trends or important events occurring in the fisheries and recommendations. This report was prepared using reports submitted by the following agencies . The Hawaii report is an integration of State of Hawaii Division of Aquatic Resources and NMFS summaries.

- Territory of American Samoa, Department of Marine and Wildlife Resources
- Territory of Guam, Division of Aquatic and Wildlife Resources
- Territory of Guam, Department of Commerce
- State of Hawaii, Division of Aquatic Resources
- Commonwealth of the Northern Mariana Islands, Division of Fish and Wildlife
- NMFS, Southwest Region (including Southwest Fisheries Science Center Honolulu Laboratory, Pacific Islands Area Office and Office of Law Enforcement)
- US Coast Guard, District 14
- Pelagic Fisheries Research Program, University of Hawaii

C. Report Appraisal

The report content has changed over the years. More recently, in addition to the four main modules (American Samoa, Guam, Hawaii, Northern Mariana Islands), the report now contains and international module, a recreational fisheries appendix, a synopsis of landings data for the US West Coast, and a section on the value of the Western Pacific Region fisheries.

D. Plan Team Members

The FMP requires the Council's Pelagic Plan Team (Team) to prepare an annual report on the status of the pelagic fisheries taking place in each of the island areas served by the Council (American Samoa, Guam, Hawaii and Northern Mariana Islands), to evaluate the effectiveness of the FMP in meeting its goals and objectives, and make recommendations for future management and administrative action.

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Table 1. Names of Pacific Pelagic Management Unit Species

English Common Name	Scientific Name	Samoan or AS local	Hawaiian or HI local	Chamorroan or Guam local	S. Carolinian or NMI local	N. Carolinian or NMI local
Mahimahi (dolphinfishes)	*Coryphaena* spp.	Masimasi	Mahimahi	Botague	Sopor	Habwur
Wahoo	*Acanthocybium solandri*	Paala	Ono	Toson	Ngaal	Ngaal
Indo-Pacific blue marlin Black marlin	*Makaira mazara:* *M. indica*	Sa'ula	A'u, Kajiki	Batto'	Taghalaar	Taghalaar
Striped marlin	*Tetrapturus audax*		Nairagi			
Shortbill spearfish	*T. angustirostris*	Sa'ula	Hebi	Spearfish		
Swordfish	*Xiphias gladius*	Sa'ula malie	A'u kū, Broadbill, Shutome	Swordfish	Taghalaar	Taghalaar
Sailfish	*Istiophorus platypterus*	Sa'ula	A'u lepe	Guihan layak	Taghalaar	Taghalaar
Pelagic thresher shark Bigeye thresher shark Common thresher shark Silky shark Oceanic whitetip shark Blue shark Shortfin mako shark Longfin mako shark Salmon shark	*Alopias pelagicus* *Alopias superciliosus* *Alopias vulpinus* *Carcharhinus falciformis* *Carcharhinus longimanus* *Prionace glauca* *Isurus oxyrinchus* *Isurus paucus* *Lamna ditropis*	Malie	Mano	Halu'u	Paaw	Paaw
Albacore	*Thunnus alalunga*	Apakoa	'Ahi palaha, Tombo	Albacore	Angaraap	Hangaraap
Bigeye tuna	*T. obesus*	Asiasi, To'uo	'Ahi po'onui, Mabachi	Bigeye tuna	Toghu, Sangir	Toghu, Sangir
Yellowfin tuna	*T. albacares*	Asiasi, To'uo	'Ahi shibi	'Ahi, Shibi	Yellowfin tuna	Toghu
Northern bluefin tuna	*T. thynnus*		Maguro			
Skipjack tuna	*Katsuwonus pelamis*	Atu, Faolua, Ga'oga	Aku	Bunita	Angaraap	Hangaraap
Kawakawa	*Euthynnus affinis*	Atualo, Kavalau	Kawakawa	Kawakawa	Asilay	Hailuway
Moonfish	*Lampris* spp	Koko	Opah		Ligehrigher	Ligehrigher
Oilfish family	Gempylidae	Palu talatala	Walu, Escolar		Tekiniipek	Tekiniipek
Pomfret	family Bramidae	Manifi moana	Monchong			
Other tuna relatives	*Auxis* spp, *Scomber* spp; *Allothunus* spp	(various)	Ke'o ke'o, saba (various)	(various)	(various)	(various)

The list of Management Unit Species (MUS) managed under the Pelagic FMP has been revised to exclude dogtooth tuna (*Gymnosarda unicolor*) and all sharks except the following nine species: pelagic thresher shark (*Alopias pelagicus*), bigeye thresher shark (*Alopias superciliosus*), common thresher shark (*Alopias vulpinus*), silky shark (*Carcharhinus falciformis*), oceanic whitetip shark, (*Carcharhinus longimanus*), blue shark (*Prionace glauca*), shortfin mako shark (*Isurus oxyrinchus*), longfin mako shark (*Isurus paucus*), and salmon shark (*Lamna ditropis*).

The previous MUS shark listing used to include oceanic species of the families Alopiidae, Carcharinidae, Lamnidae, Sphynidae. However, this could be construed to mean all members of the these four shark families, which would also include nearshore and demersal sharks. The Pelagics Plan Team recommended in 1999 revising the sharks contained in the management unit when the Council had completed a Coral Reef Ecosystem FMP (CREFMP), which would include nearshore species in the management unit The Plan team also recommended removing dogtooth tuna as this is not a true pelagic fish but a nearshore reef species. The CREFMP was completed in 2001 and among other measures, amended the Pelagics FMP by removing dogtooth tuna from the management unit and listed only 9 true pelagic sharks for inclusion therein (Table1).

A summary of the total pelagic landings during 2002 in the Western Pacific and the percentage change between 2001 and 2002 is shown in Table 2.

Table 2. Total pelagic landings in lbs in the Western Pacific Region in 2002

Species	Am Samoa	% change	Guam	% change	Hawaii	% change	CNMI	% change
Swordfish	37,101	607.8%			461,000	-7.8%		
Blue marlin	74,257	106.2%	53,553	61%	1,001,000	-33%	1,261	-18.1%
Striped marlin	3,850	-64.3%			558,000	-36.1%		
Other billfish	12,347	39.1%	2,285	9040%	371,000	5.4%	18	-75.3%
Mahimahi	86,513	15.6%	172,674	-6.2%	1,164,000	-2.3%	17,937	57.6%
Wahoo	358,238	230.4%	71,810	-40%	620,000	-32.8%	8,160	124.2%
Opah (moonfish)	6,762	-19.9%			915,000	21%		
Sharks (whole wgt)	6,540	72.1%	0	-100%	388,000	18.7		
Sharks fins								
Albacore	13,104,279	82.7%			1,522,000	-52.9%		
Bigeye tuna	431,711	163.6%			10,266,000	74.8%		
Bluefin tuna					2,000	0%		
Skipjack tuna	520,265	256.9%	175,836	-47.2%	986,000	-41.9%	177,487	65.7%
Yellowfin tuna	1,079,598	163.9%	44,932	-23.4%	2,462,000	-40.61%	29,394	152.7%
Other pelagics	11,299	-7.8%	12,765	230%	676,000	71.1%	19,017	145.5%
Total	15,732,759	92.8%	533,855	-42%	21,392,000	-1.7%	253,274	86.6%

II. Summary [2]

A. Plan Administration

A final rule that would implement a Council recommendation to prohibit vessels more than 50' in length overall from targeting PMUS within 50 miles from shore around American Samoa was published on January 30, 2002 (67 FR 4369, January 30, 2002). This measure was made to alleviate some of the interaction problems associated with the rapid expansion of the American Samoa longline fleet in 2001 and was intended to address concerns that the entry of vessels greater than 50 ft (15.2 m) in length into the pelagic fishery around American Samoa could lead to gear conflicts and catch competition with locally based small fishing vessels. Such conflicts and competition could lead to reduced opportunities for sustained participation by residents of American Samoa in the small-scale pelagic fishery. Final Council action was taken at the 114th Council Meeting held by teleconference from Honolulu on August 20, 2002.

On June 3, 2002, an advance notice of proposed rulemaking was published in the Federal Register (67 FR 38245). This notice served to establish a revised control date for persons who enter the pelagic longline fishery in the U.S. exclusive economic zone (EEZ) around American Samoa. A new control date of March 21, 2002 was proposed (which was previously established as November 13, 1997, then revised to July 15, 2000) where future participation in the fishery would not be guaranteed after this date. This action did not commit WPRFMC or NMFS to limit entry, or prevent any other date from being selected for eligibility to participate in the American Samoa longline fishery.

On April 29, 2002, NMFS published a proposed rule (67 FR 20945) intended to reduce interactions between endangered and threatened sea turtles and pelagic fishing gear and to mitigate the harmful effects of interactions that occur. NMFS issued a final rule (67 FR 40232, June 12, 2002) under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region that implemented the reasonable and prudent alternative of the March 29, 2001, Biological Opinion (BiOp) issued by NMFS under the Endangered Species Act (ESA). The rule is intended to reduce interactions between endangered and threatened sea turtles and pelagic fishing gear and to mitigate the harmful effects that occur. The rule applies to the owners of all vessels fishing for pelagic species under Federal western Pacific limited access longline permits within the U.S. EEZ and high seas around Hawaii. This rule prohibits the targeting of swordfish north of the equator by longline vessels, closes all fishing to longline vessels during April and May in waters south of the Hawaiian Islands (from 15° N. Lat to the equator, and from 145° W. Long. to 180° long.), prohibits the landing or possessing of more than 10 swordfish per fishing trip by longline vessels fishing north of the equator, allows the re-registration of vessels to Hawaii longline limited access permits only during the month of October, requires all longline vessel operator to annually attend a protected species workshop, and requires utilization of sea turtle handling and resuscitation measures on both longline vessels and non-longline pelagic vessels using hook-and-line gear.

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[2] Percentages in parentheses indicate percent change from previous year

B. Island Areas

In **American Samoa,** total landings of all pelagic species increased 92%, continuing an upward trend in pelagic landing that commenced in1994. An estimated 15,732,759lb (+92.8%) of pelagic fish were landed in 2002, of which 15,327,765 lb were commercial landings valued at $13,737,300 (+75.7%). The average price for all pelagics was $0.90/lb (- 8.2%).

Seventy-three vessels reported landing pelagic species in 2002, which is down from the eighty vessels in 2001. Of these, 58 reported fishing with longline gear (-6%), and 15 reported fishing as trollers (-16.7%).

Trolling vessels made 286 trips in 2002, a decrease of 13.6% from 2001 and 57.6% lower than the long term average. Longline data are derived from both creel survey extrapolations and through submitted logbooks. Logbook data reported a total 6,861 sets for 2002, or an increase of 42.9% from 2001. Creel survey extrapolation reported 7,419 longline sets for 2002, a 57.1 % increase on the 2001 creel survey estimate of sets. The average duration for trolling trips in 2002 was 4.7 hr/trip, an 6% decrease from 2001. The average longline set duration calculated via logbooks was 16.8 hr/set (+29.2%) and by creel survey was 18.5 hrs/set (+9.5%). Since the longline fishery began in 1996 till 2002, trolling trips have declined by about 66% and longline sets have substantially increased by nearly 1,200%. Data from the troll fishery suggests that the catch per unit effort (CPUE) in 2002 increased by 15.1% but was about 17% below the long term average. The average size of albacore has remained relatively stable between 1996 and 2002, between 43-46 lb/fish. Albacore accounts for about 83% of the total longline catch. Overall longline catch rates decreased about 6% between 2001 and 2002, and albacore catch rates decreased (26%).

In **Guam**, landings of all pelagics amounted to 533,855 lbs, an decrease of 30%. Tuna landings decreased to 223,125 (-45 %). The overall tuna landings have fluctuated around a relatively constant average for the past decade, but the gradually increasing trend decreased in 2002 from 2001 by nearly 45% (223,125 lbs). Non-Tuna PPMUS landings decreased to 300,841 lb (-10.8%). Landings in 2002 followed the 1997 trend in Guam's pelagic fisheries towards targeting other PPMUS, principally mahimahi and wahoo, rather than tuna. Tunas comprised about 41% the 2002 pelagic landings, between the previous three years where they formed between 40 and 58% of pelagic landings. Mahimahi comprised 32 %, yellowfin tuna 8.4%, skipjack 33%, blue marlin 10%, and wahoo 13.5%,of the total pelagic landings.

Guam's adjusted prices for pelagic fish for 2002 followed the general decline that began1980. The adjusted price ($/lb) of tuna and non-tuna PPMUS saw a decline this year.

Virtually all the landings of pelagic fish are made by trolling vessels. The fleet size in 2002 was the same as in 2001 at an estimated 375 vessels, and was still above the long term average (+7.4%). The number of trips (8,933) was down in 2002 (-25.7%), as was hours fished (41,040) and hours per trip (4.6) were down 29% and 4.2%, respectively, from 2001.

Transhipment activity in Guam decreased (-39%) overall in Guam during 2002 from 2001, with yellowfin tuna landings decreasing by 47% and bigeye by 35%.

Charter boat activity dropped for the fifth year in a row, due to a decrease in tourism as a result of many factors including economic recession in Japan, continued threat of terrorist activities following September 11, and the after-effects of the two most recent devastating typhoons "Chata'an" and "Pongsona". Preliminary losses estimated for the Guam Fishermen's Cooperative from supertyphoon Pongsona, include $15,000 in fish inventory; $80,000 in equipment; $200,000 in infrastructure; $20,000 in recovery expenses; and $120,000 in lost revenue. To ascertain the extent of the damage to the fishing sector, Guam's Bureau of Statistics and Plans, with support from the Western Pacific Fishery Management Council, will conduct a Fishery Damage Rapid Assessment.

The **Hawaii** fisheries for PPMUS produced total pelagic landings in excess of 21 million lb in 2002, but was still a decrease (-1.7%) from 2001. Bigeye tuna (48%), yellowfin tuna (11.5%), albacore tuna (7.1%), and mahimahi (5.4%) were the dominant species in the catch. Other major components of the pelagic fishery include blue marlin (4.7%), and skipjack tuna (4.6%). Swordfish landings of 461,000 lb in 2002 were 7.8% lower than in 2001. Blue marlin catches decreased by about 33% from 2001 while striped marlin catches also decreased (36.1%) during 2002. Apart from moonfish catches, which increased in 2002 by about 21%, albacore (-52.9%), skipjack tuna (-41.9%) and yellowfin tuna (-40.61%) all declined significantly in 2002. Overall tuna landings in 2002 were similar to 2001, with a small increase of about 2% between years. However, bigeye tuna landings increased by over 74.8% between years.

Total pelagics revenue increased by about 5% to $ 45.354 million, with an average price per pound for pelagic in 2002 of $2.12/lb, compared to $1.99/lb in 2001. In 2002 the inflation adjusted ex-vessel revenue for the longline fishery increased by about 12.3 % to $37.5 million, while the combined MHI handline/offshore handline fishery revenues decreased by 29.7%, the troll fishery decreased by about 24% and the aku baitboats decreased by 45.7%.

Catch rate by trollers for mahimahiwas up in 2002 (+14.8%). Catch rate by trollers for wahoo and blue marlin were down in 2002 (-20.8% and -7.1%, respectively).Catch rates by trollers for striped marlin, yellowfin, and skipjack stayed the same at 4, 24, and 10 lbs/trip, respectively. Catch rates by MHI handliners in 2002 were lower for albacore (-2.1%) and yellowfin (-19.9%). Catch rates by MHI handliners in 2002 were higher for bigeye (+25.9%). In the offshore handline fishery, catch rates in 2002 were higher for bigeye (+58.8%), but lower for yellowfin (-35.4%) and mahimahi (-21.9%).

The Hawaii longline fleet landed 17.16 million lb of fish in 2002, a 10.4% increase from 2001 landings. Of the billfish landed in Hawaii, longlining accounted for most of the swordfish (97.6%), striped marlin (89.2%) and blue marlin (58.1%). About 11% of the longline landings (1.883 million lb) were billfish, and 24% of billfish landings were swordfish. The longline fleet also accounted for all of the bluefin tuna (100%), sharks (100%), and moonfish (100%), and most of the bigeye tuna (94%) and albacore (76%) landed in Hawaii.

Fishing effort for the combined pelagic fisheries in Hawaii remained at a high level in 2002. The number of Hawaii-based longline vessels fell to 100 vessels in 2002. Many of the longline vessels that targeted sowrdfish now operate out of California. Twenty-one California-based longline vessels submitted federal High Seas longline logbook data in 2002. All but one fished out of Hawaii before 2000. Almost all of the vessels in the California-based longline fishery target swordfish. The total number of longline trips out of Hawaii has remained relatively stable over the past ten years. However, there has been a significant change with a shift of longline effort from swordfish to tunas. The number of swordfish-directed trips has declined from 319 in 1993 to 0 in 2002. In contrast, tuna-directed effort has increased during this period, from 458 trips in 1992 to 1,162 trips in 2002. Pelagic landings of the main Hawaiian Islands (MHI) troll and handline fisheries were relatively stable throughout the late 1980s to 2000, but decreased by 30% and 22% from 2001 to 2002. Catch by the aku boat fleet (pole-and-line for skipjack tuna) has been on a declining trend down to a historic low in 2002. The offshore handline fishery has grown into a fishey with catches that rivals and often exceeds catches of the established aku boat fishery.

Landings of all pelagics in the **Northern Mariana Islands** (NMI), increased (+86.6%) between 2001 and 2002 to 253,274 lb and was 10.4% above the long term average. Skipjack landings of 177,487 lb were up (+65.7%) from 2001, and was above (+8.1%) the long term average. Yellowfin tuna landings increased sharply from 2001 in 2002 (+152.7%) and was also above the long term average (+61.2%). Landings of mahimahi continued to increase, up 57.6% from 2001 after the decrease in landings from 1996 to 2000. Mahimahi was lower (-8.3%) than the long term average. Wahoo landings increased (+124%) from 2001 and was 1.5% above the long term average. Blue marlin landings decreased significantly (-18%), and continued to be below the long term average (-65.4%).

The sharp increase in landings during 2002 were matched by an equally sharp (+74.4%) increase in total adjusted revenues ($499,730) over those in 2001. This increase in adjusted revenues was entirely due to the major increase in the revenues from PPMUS (+76%), particularly tuna revenues, which increased by about 75.1%.

The number of fishers making commercial pelagic landings decreased in 2002 (-23.2%), from 112 to 86, and was below the long term average (-2.3%). The number of trips landing any pelagic fish also decreased by 17% in 2002 but was higher (+15%) than the long term average. Thus, the average number of trips per fisher in 2002 increased to 21 from 19.4 trips per fisher in 2001.

The inflation adjusted price of tunas increased and non-tuna PPMUS decreased in 2002. The average adjusted price of tunas increased slightly to $2.00/lb (+1.5%) and of other PPMUS decreased to $1.85/lb (-12.7%). Tuna prices (+2.6%) was above the long term average, and prices for other PPMUS (-12.7%) were below the long term average.

C. Species

Mahimahi landings (86,513 lb) in American Samoa during 2002 were the highest since the fishery began, increasing 15.6% from 2001, with 99% of the landings coming from the longline

fishery. Guam's 2002 mahimahi landings (172,674 lb) dropped slightly (-6.2%) from 2001. Year 2002 landings were 3% below the long term average. Mahimahi landings in Guam have displayed wide, unexplained annual fluctuations since 1987. The trolling catch rate for mahimahi was at its highest in four years in 2002 with a CPUE of 4.2 lbs/hr. Mahimahi landings (1,164,000 lb) made up 30.9% of the 2002 non-tuna PMUS landings in Hawaii, a slight decrease of 2.3%. The troll catch rate in Hawaii in 2002 was 14.8% higher than the 2001 rate, and 40.3% above the long-term average. Northern Marianas mahimahi landings (17,937 lb) continued to increase substantially in 2002, continuing the increase from 2001 that ended a downward trend that started in 1997. As with Guam, NMI experiences annual fluctuations in the catch of mahimahi. Mahimahi accounted for 44% of the total non-tuna PPMUS landings. The trolling catch rate in 2002 in the NMI was up (+52%) from 2001.

Blue marlin catches in American Samoa increased (106.2%) after a 27% decrease in 2001, and the longline fishery took 100% of the total blue marlin catch. Guam landings of blue marlin (53,553 lb) rebounded in 2002, after a 19-year low in 2001. The trollingcatch rate was still below the long term average in 2002 (-7.1%). Blue marlin landings (1.001 million lb) in 2002 in Hawaii were 33% lower than in 2001. Longliners accounted for 58.1% of the total Hawaii blue marlin landings. Blue marlin landings in the Northern Marianas (1,261lb) continued a five-year decline, with 2001 landings only 15% of the 1996 level.

The catch rate of blue marlin in the American Samoa troll fishery continued to be 0.00 lb/troll-hr for only the second time since 1987, while the longline fishery had a CPUE of 0.22 from the logbooks, and 0.35 from the creel surveys. In Guam, blue marlin troll catch rate in 2002 (1.3 lb/troll-hr) increased from 2001 (0.6 lb/troll-hr)by nearly 117%. In the Hawaii longline fishery, blue marlin tends to be caught incidentally at a higher rates on mixed trips than in either tuna trips or swordfish trips. Court-ordered regulations limiting swordfish-directed effort implemented in 2000 either forced vessels to convert and target tunas or leave Hawaii and fish elsewhere. Therefore, only data on tuna trips for blue marlin is available. The catch rate of blue marlin decreased on tuna trips to 0.3 in 2001 to 0.2 in 2002. The catch rate of blue marlin in the Hawaii commercial troll fishery decreased 7.1% and was 9.7% lower than the long-term average. In the Northern Marianas, the 2002 catch rate decreased by about 20.5% from 2001, and was 70% below the long-term average.

Striped marlin landings ranked second among the billfish in Hawaii (after blue marlin), and in 2002 it accounted for 23% of the commercial landings of non-tuna PPMUS. The 2002 landings of 558,000 lbs were down from 873,000 lbs in 2001, a decrease of over 36%. Striped marlin is regarded as a secondary target species (after bigeye tuna) in the winter longline fishery. Landings in the Hawaii commercial troll and handline fisheries during 2002 (59,000 lb, -37.2%) were down from 2001 and nearly 18% below the long-term average. The species rarely appears in the domestic landings from other areas, but increasing amounts of striped are being caught in American Samoa's developing longline fishery, with 3,850 lb landed in 2002, down 64.3% from 2001.

Sailfish landings were insignificant in most areas, however Guam reported an estimated catch of 2,285 lbs in 2002, which is a significant increase from 2001 (over 9000%). American Samoa's

reported landings of 7,064 lb of sailfish in 2002 was an increase of 53.8% on 2001 landings (4,593 lb) and above the long term average of 4310 lb.

Estimated domestic landings of Hawaii **shark** increased by 18.7% between 2001 and 2002. The decrease from years previous to 2001 was due to regulations banning shark finning. Shark landings from other areas were relatively minor, although landings in American Samoa increased from 2001-2002 by 72% to 6,540 lbs. Virtually the entire shark landings for Hawaii come from longline vessels. However, the Bottomfish Plan Team has also noted that Northwestern Hawaiian Islands bottom fishery also lands fins of coastal and reef sharks taken incidentally [3], although the quantity has not been estimated.

Shortbill spearfish landings were reported for the first time in American Samoa at 610 in 1999, but landings amounted to only 138 lb in 2000. Landings increased to 1792 lb in 2001, and continued to increase to 3,033 lb in 2002 (+69%). No catches were reported in Hawaii, Guam or NMI during 2002.

The **swordfish** longline fishery in Hawaii began in 1989 with landings of 0.6 million lb, increasing to 3.4 million lb in 1990, and peaking at 13.1 million lb in 1993. Swordfish landings declined in 1994 and 1995 but may be leveling out and stabilizing at about 6-7 million lb. Landings in 2002 amounted to 0.46 million lbs a decline of about 6% from 2001. The estimated average weight of longline-caught swordfish was 146 lb in 2002 the fifth-smallest average size since 1987. Swordfish comprised only 19.3% of the total billfish PMUS landings by all fisheries in Hawaii. The longline catch rate of swordfish has remained steady since 1998, and about 4% slightly below the long-term average between 1991 and 2002, at 0.1 fish per 1000 hooks in the tuna trip fishery. Other areas did not report landings of swordfish, apart from a significant increasing volume of swordfish in the American Samoa longline fishery, which landed 37,101 lb in 2002, up (+607.8%) from 2001.

American Samoa reported landings of 13,104,279 lb of **albacore** during 2002, a 82.7% increase on 2001 landings. This was the highest albacore landing recorded by the American Samoa fleet. Hawaii total landing of albacore (1.522 million lb) in 2002 was a 52.9% decrease from 2001. Landings of albacore by longline vessels decreased 58.7% in 2002. Other areas did not report landings of albacore.

Hawaii landings of **bigeye** tuna (10.266 million lb) were higher in 2002than 2001, and almost all (94.2%) caught by longline. No other areas reported bigeye landings apart from American Samoa, where the expanding longline fishery in 2002 caught 431,711 lb, or an increase of 163% on 2001 landings.

Skipjack tuna landings in American Samoa in 2002 (520,265 lb) increased (+256.9%) continuing the increase seen in 2001. The 2002 landings were almost 293% higher than the long-term average between 1982 and 2001. The largest decline in skipjack landings occurred in the troll fishery (-27.3%), compared with the increase in the longline fishery (+269%). Due to the

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[3]. WPRFMC Bottomfish Plan Team meeting, March 27-28 , 1996, Executive Centre Hotel, Honolulu, HI.

focus on longlining, troll landings continued to be significantly below the long term average, representing only 16% of the average of troll landings between 1982 and 2001. However, trolling catch rate was only about 27% lower than the 2001 value and 83% lower than the long-term average. Guam skipjack landings in 2002 (175,836 lb) decrease following an all time high in 2001. This represented a one year decrease of about 47% on the 2001 landings, but still 8.2% higher than the long-term average. Catch rates decreased from 5.8 lb/trolling hour to 4.3 lb/trolling hour, a decrease of about 26% . Hawaii skipjack landings in 2002 of 986,000 lbs represented an decrease of about 41.9%. The skipjack were caught principally by baitboats, which landed 529,000 lb of skipjack in 2001, which was over half (53.7%) of the 2002 total landings. Northern Marianas Islands skipjack landings increased by about 65.7% from 133,884 1b in 2001 to 177,487 lb in 2002. The catch rate also increased by 60% from 2001, and was 12.9% below the long-term average.

Yellowfin tuna landings in American Samoa (1,079,598 lb) increased by 164%; the longline fleet catching 98.9% of the yellowfin which had a 115% increase in catch rates from 2001 logbook data, and was about 154% higher in 2002 from creel survey data. Catch rates increased 145% in the troll fishery and was above the long term average. Guam yellowfin landings (44,932 lb) decreased 23.4% in 2002, continuing the decline from 2000. Catch rates were 10% higher in 2002 and 39% below the long term average. The total Hawaii commercial landings of yellowfin (2.462 million lb) were 40.6% lower than 2001. Landings of yellowfin by commercial trollers (-27.2%) decreased in 2002, while landings by longliners decreased between 2001 and 2002 (-43.7%). The 2002 longline CPUE of yellowfin by directed tuna trips was 52.9% lower than the 2001 CPUE.

Northern Mariana Islands yellowfin landings increased substantially in 2002 to 29,394 lb, a 152.7% increase from 2001 and 102% above the long term average. Catch rates increased in 2002 (16.3 lb/hr) 144% and was 38.7% higher than the long-term average.

Wahoo landings in American Samoa continued to its significant increase (+230%) in 2002 (358,238 lb), following a dramatic increase in 2001. This increase in landings was generated from the longline fishery as catch from trolling was about .001% of the total. The trolling catch rate continued the decline that started in 1996, and was 29% lower than the long term average at 0.41 lb/hr. Guam's wahoo landings continue to show extreme interannual variability, dropping 51% in 1999 after a 140 % increase in 1998 and a 56% decrease in 1997. Landings of wahoo in Guam (71,809 lb) continued this pattern and decreased by about 40% in 2002 from 2001 and was16.7% lower than the long term average. Wahoo landings in Hawaii decreased (-32.8%) from 922,000 lbs to 620,000 lbs between 2001 and 2002. The 2002 trolling catch rate for wahoo in Hawaii was up by 20.8%. The Northern Marianas wahoo landings (8160lb) and catch rate (4.53 lb/trip) increased from the 2001 estimates. The catch was still greater than the long term average for the first time since 1996, while the CPUE was its highest since 1999 but still below the long term average.

D. Gear

Troll fisheries continue to dominate the domestic fisheries in Guam and the Northern Mariana Islands, in contrast to American Samoa, where the expanding **longline fishery** now accounts for

99.8% of PPMUS landings. Growing charter fishing businesses in Guam and the Northern Mariana Islands contributed heavily to troll fishing effort. In Hawaii, longline landings continue to dominate pelagic fisheries production and in 2002 accounted for 80.2% of the landed volume of PPMUS.

III. Issues

One of the most important pelagic fisheries in Hawaii after the longline fishery is the offshore tuna handline fishery, based primarily at the Cross Seamount. This area continued to generate concerns due to the high volume of juvenile yellowfin and bigeye tunas caught at this location, and its effects on tuna stocks around Hawaii. Handline fishermen using the Cross Seamount have, in the past, expressed concerns about longline vessels fishing in the same location, due to gear interactions and safety at sea issues. Concerns were also expressed about uncontrolled entry into the handline fishery by longliner vessels displaced by recent management measures imposed on the Hawaii-based longline fishery. The Council responded in part by implementing a new control date for the fishery of 15th of July 2000. More recently, the downturn in the economy may have promoted the increase in the level of new entries into the Cross Seamount fishery from other fishery sectors.

Another issue in 2002 dealt with the targeting of swordfish in the Hawaii longline fishery. A formal section 7 consultation under the ESA was concluded for the FMP resulting in the March 29, 2001 BiOp. In the BiOp, NMFS determined that fishing activities conducted under the FMP and its implementing regulations were likely to jeopardize the continued existence of the green sea turtle, leatherback turtle, and loggerhead turtle and prescribed a non-discretionary reasonable and prudent alternative for this FMP to avoid the likelihood of jeopardizing the continued existence of these sea turtles. Interactions between endangered and threatened sea turtles and pelagic fishing gear was reduced by NMFS by implementing measures from the BiOp on the Pelagic FMP to mitigate the harmful effects of interactions that occur. The rule implemented rule applies to the owners of all vessels fishing for pelagic species under Federal western Pacific limited access longline permits within the U.S. EEZ and high seas around Hawaii. This rule prohibits the targeting of swordfish north of the equator by longline vessels, closes all fishing to longline vessels during April and May in waters south of the Hawaiian Islands (from 15° N. Lat to the equator, and from 145° W. Long. to 180° long.), prohibits the landing or possessing of more than 10 swordfish per fishing trip by longline vessels fishing north of the equator, allows the re-registration of vessels to Hawaii longline limited access permits only during the month of October, requires all longline vessel operator to annually attend a protected species workshop, and requires utilization of sea turtle handling and resuscitation measures on both longline vessels and non-longline pelagic vessels using hook-and-line gear.

IV. 2002 Region-wide Annual Report Recommendations

1. **The Plan Team recommends that there should be review on the potential impacts of 'HACCP', on the disposition of fish landings throughout the region.**

2. **The Plan Team recommends that a Plan Team subcommittee should work out**

standards for how to present 'non-PPMUS' in pelagic reports.

3. **The Plan team notes that a top priority for supporting ongoing efforts (NMFS Honolulu Laboratory, MRFSS, PFRP etc.) should be the collection (and upkeep) of baseline data that will be used to estimate the impact of regulatory (or other) changes. This includes vessel cost/earnings simulators for each fishery, community profiles of each island or island area, input/output or economic models to understand economy wide impacts, and cultural investigations.**

V. Plan Administration

A. Administrative Activities

The final rule for the 50 nm closed areas around American Samoa was published in the Federal Register (67 FR 4369, January 30, 2002). This measure was made to alleviate some of the interaction problems associated with the rapid expansion of the American Samoa longline fleet in 2001 and was intended to address concerns that the entry of vessels greater than 50 ft (15.2 m) in length into the pelagic fishery around American Samoa could lead to gear conflicts and catch competition with locally based small fishing vessels. Such conflicts and competition could lead to reduced opportunities for sustained participation by residents of American Samoa in the small-scale pelagic fishery. Final Council action was taken at the 114th Council Meeting held by teleconference from Honolulu on August 20, 2002.

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trip by longline vessels fishing north of the equator, allows the re-registration of vessels to Hawaii longline limited access permits only during the month of October, requires all longline vessel operator to annually attend a protected species workshop, and requires utilization of sea turtle handling and resuscitation measures on both longline vessels and non-longline pelagic vessels using hook-and-line gear.

B. Longline Permits

During 2002, 164 permits, the maximum allowed under the FMP, were maintained in the Hawaii longline limited entry fishery. Of the 164 issued permit holders, 46 were without vessels for those permits. PIAO also processed 29 transfers. PIAO also issued Western Pacific general longline permits for the pelagic fisheries in American Samoa (88 permits).

The names of vessels registered with Hawaii limited entry and Western Pacific longline permits and permit holders are listed in Table 3.

C. Foreign Fishing Permits

No administrative actions relating to foreign fishing in the western Pacific EEZ were required because no foreign fishing permits were requested for any vessels with which the US has a Governing International Fishing Agreement.

Table 3. Hawaii longline limited entry permit holders in 2002

VESSEL NAME	HOLDER
F/V ADRAMYTTIUM	THK Fishing Inc.
F/V ANNA	MTA Corp.
F/V ARROW	Arrow Inc.
F/V BARBARA H	Arthur/Barbara Haworth
F/V BLACK MAGIC	Black Magic LLC
F/V BLUE FIN	Liet An Lu/Mai Thi Do
F/V BLUE SKY	Blue Sky Fishing Producer
F/V CAPT. GREG	Aquanut Co. Inc.
F/V CAPT. MILLIONS I	Nga Van Le
F/V CAPT. MILLIONS III	Capt. Millions III Inc.
F/V CAPT. MILLIONS IV	H and M Fishery Inc.
F/V CRYSTAL	Davis B Inc.
F/V CUMBERLAND TRAIL	Leland Oldenburg
F/V DAE IN HO	KYL Inc.
F/V DAE IN HO IV	Wynne Inc.
F/V DASHER II	DukSung Fishing Inc.
F/V DEBORAH ANN	Amko Fishing Co. Inc.
F/V EDWARD G	Edward G. Co. Inc.
F/V EXCALIBUR	Bruce Picton
F/V FINBACK	Vessel Management Assoc.
F/V FIREBIRD	Firebird Fishing Corp.
F/V GAIL ANN	Gail Ann Co. Inc.
F/V GARDEN SUN	Konam Fishing Co., Inc.
F/V GLORY	Roy Yi
F/V GOLDEN SABLE	Golden Sable Fisheries Inc.
F/V GRACE	Kim Fishing Co.
F/V HANNAH LEE	Natali Fishing Inc.
F/V HAVANA	Thomas Webster
F/V HAWAII POWER	Intl. Quality Fishery Inc
F/V HEOLA	H & M Marine Inc.
F/V HOKUAO	White Inc.
F/V IMMIGRANT	Martin Noel Inc.
F/V INDEPENDENCE	Independence Inc.
F/V JANTHINA	Trans World Marine Inc.
F/V JENNIFER	Kil Cho Moon
F/V KAIMI	Vessel Management Assoc.
F/V KAIMI M.	Pacific Jennings Inc.
F/V KATHERINE II	K.A. Fishing Co. Inc.
F/V KATHERINE III	K.R. Fishing Inc.
F/V KATHERINE VII	Katherine VII LLC
F/V KATHERINE Y	Song Fishing Corp.
F/V KATY MARY	Vessel Management Assoc.
F/V KAWIKA	Vessel Management Assoc.
F/V KAY	Young S. Fishing Inc.
F/V KELLY ANN	Kelly Ann Corp.
F/V KEMA SUE	Kema Sue Inc.
F/V KILAUEA	Aukai Fishing Co.Ltd.
F/V KINGFISHER	Quan Do

F/V KINUE KAI	Awahnee Oceanics Inc.
F/V KOLEA	Paik Fishing Inc.
F/V KUKUS	Kuku Fishing Inc.
F/V LADY ALICE	Lady Alice Co. Inc.
F/V LADY CHUL	Jong Ik Fishing Co. Inc.
F/V LEA LEA	M.S. Honolulu Inc.
F/V LEGACY	Amak River Legacy
F/V LIHAU	White Inc.
F/V MAN SEOK	KMC & PCC Inc.
F/V MANA LOA	Two Bulls Inc.
F/V MARIAH	Vessel Management Assoc.
F/V MARIE M	Viking V Inc.
F/V MARINE STAR	Viking V Inc.
F/V MIDNIGHT III	Albert K. Duarte
F/V MISS JANE	Palmer Pedersen Fisheries
F/V MISS JULIE	Quan Do
F/V MISS LISA	Miss Lisa Inc.
F/V MOKULELE	Robert Cabos
F/V PACIFIC FIN	Fishrite Inc.
F/V PACIFIC HORIZON	John Gibbs
F/V PACIFIC REFLECTION	Gunn Pacific Reflection
F/V PACIFICA	Jackson Bay Co.
F/V PAN AM II	Dongwon Marine Inc.
F/V PARADISE 2001	Dang Fishery Inc.
F/V PARADISE 2002	Nguyen Fishery Inc.
F/V PEARL HARBOR II	Gilbert DeCosta
F/V PETITE ONE	Ka'upu Ltd.
F/V PIKY	M/V Piky Inc.
F/V PRINCESS K	Princess K Fishing Corp.
F/V QUEEN DIAMOND	Queen Diamond Inc.
F/V QUYNH VY	Reagan Nguyen
F/V RACHEL	Bethel Inc.
F/V RED BARON	Donald Aasted
F/V RED DIAMOND	Xuan Nguyen
F/V ROBIN	Univeral Fishing Co.
F/V ROBIN II	Robin Fishing Inc.
F/V ROBIN V	L.S. Fishing Inc.
F/V SANDY DORY	Highliner Inc.
F/V SAPPHIRE	H-N Fishery Inc.
F/V SAPPHIRE II	H-N Fishery Inc.
F/V SEA DIAMOND	Nancy Nguyen
F/V SEA DIAMOND II	Sea Diamond II Inc.
F/V SEA FALCON	Frank/Michelle Crabtree
F/V SEA GODDESS	Capt. Washington I Inc.
F/V SEA HAWK	Hawaii Fishing Co.
F/V SEA MOON	Sea Flower Inc.
F/V SEA MOON II	Sea Moon II Inc.
F/V SEA PEARL	Coldwater Fisheries Inc.
F/V SEA SPIDER	Paul Seaton, Trustee
F/V SEASPRAY	Hanson/Hanson Fishing Co.
F/V SEEKER II	Seeker Fisheries Inc.
F/V SEVEN STARS	Kwang Myong Co. Inc.
F/V SKY SUN	Kyong Dok Kim
F/V SPACER K	Hwa Deog Kim
F/V ST. MICHAEL	Tony/Lorna Franulovich
F/V SWELL RIDER	Bayshore Mgmt. Inc.
F/V SYLVIA	B-52 Inc.
F/V TUCANA	Pacific Boat Corp. Inc.
F/V TWO STAR	Two Bulls Inc.
F/V ULHEELANI	Ulheelani Corp.
F/V VICTORIA	Aegis Fishing Inc.
F/V VIRGINIA CREEPER	Sylvan Seafoods Inc.
F/V VUI VUI II	Vui Vui, A Limited Partner
F/V VUI-VUI	Nick Van Pham
F/V WHITE NIGHT	Natalia/Kiril Basargin
F/V WONIYA	Sierra Fisheries Inc.
F/V ZEPHYR	Zephyr Fisheries LLC

2001 Hawaii longline permit holders without vessels

Andy Hoang	
Bac Tran	
Christine Tran	2 permits
Diana Thi To	
Duoc Nguyen	
Gary Painter	
Hong Lu	
Hong Thanh Nguyen	
James Chan Song Kim	
Jerry Ray	
Lady Ann Margaret Inc.	
Lan Thi Van	
Larry DaRossa	
Liana Do	
Lindgren-Pitman Inc.	
Long Thanh Nguyen	
Ocean Associates Corp.	
Pacific Fisheries Corp.	
Pacific Fishing & Supply	3 Permits
Pacific Seafoods Inc.	3 Permits
Quy Thanh Truong	
Quang Nguyen	
Richard Galimore	
Scotty Nguyen	
Sea Dragon II Inc.	
Shaman Partnership	
Steven Nguyen	
Stewart Miyamoto	
Tina Hoang	
Tom The Van Le	
Tom C.Y. Kim	
Tony Phan Truong	
Tuan Nguyen	
Twin N Fishery	
Vessel Management Assoc.	6 permits

Western Pacific General Longline Permit Holders in 2002

American Samoa

VESSEL NAME	PERMIT HOLDER
F/V ADELITA	Adelita Fishing LLC
F/V AETO	Aleni Ripine
F/V ALI-B	Harbor Refuse and Environmental Services
F/V ALLIANCE	Offshore Adventures Inc.
F/V AMERICA	Robert/Dorothy Pringle
F/V APIALOFI	Apisaloma Ala
F/V AURO	Longline Services Inc.
F/V BREANA LYNN	Robert/Dorothy Pringle
F/V CAPT. CARLOS ANDRES	Afoa Lures
F/V CAPTAIN MICHAEL JOSEP	Afoa Lures
F/V CAROLYN J	Mid Pac Fisheries
F/V CHIEF TAPEET	Aiga Ma Uo LLC
F/V EASTWARD	Eastward Corp.
F/V ENTERPRISE	Golden Gate Systems LLC
F/V FA PEPA SAI	Joseph/Maria Parisi
F/V FAIVAIMOANA I	Faivaimoana Fishing Co Lt
F/V FETUOLEMOANA	Tuna Ventures Inc.
F/V FLORA	Feli Fisheries Inc.
F/V FOTOLUPE	Richard Solaita
F/V FUAO I	Asifoa & Sons Inc.
F/V FUAO II	Sosene Asifoa
F/V GALUEGA FOU	Floyd Scanlan
F/V GOGOSINA	Native Resources Develope
F/V GREEN PEACE I	Maselino Ioane
F/V INJA	Taufuiava Vaivai
F/V ISLAND PEARL	Vaimaga Maiava
F/V JIMMY JR.	Jimmy Vaiagae
F/V JULIE IRENE	Michael Pulu
F/V K114	Peter Betham
F/V KATHERYN ANN	Silva Fishing Inc.
F/V KMJ	Florida and Sitala Sitala
F/V L.J. EXPRESS I	Letalitonu Alofaituli
F/V L.J. EXPRESS II	Letalitonu Alofaituli
F/V LADY ANA	Maselino Ioane
F/V LADY BARBARA	Barbara H. Inc.
F/V LADY CELES	Fred Kruse
F/V LADY ELINOR	Afoa Lures
F/V LADY FRANCELLA II	Faamausili Pola
F/V LADY HANNACHO II	Afoa Lures
F/V LADY LEANN II	Steve Vaiau
F/V LADY LU	Lu's Fish Grotto
F/V LADY MONA LISA	Terry Chang
F/V LADY NOELA	Eveni John Pilcher
F/V LADY TAUFAGALUPE	Pesa Vee
F/V LADY TUA I	Peter Betham
F/V LADY TUA II	Peter Betham
F/V LAURA ANN	Crivello Fishing LLC
F/V LEANN III	Steve Vaiau
F/V LEONE LINERS V-1	Posu Tue
F/V MIDDLEPOINT	Island Tuna Mgmt. Inc.
F/V MISS ANN LOUISE	Charles Coules
F/V MOLLY N	Robert/Dorothy Pringle
F/V MONIQUE I	William Hollister
F/V MONIQUE II	William Hollister
F/V NO 1 JI HYUN	Ji Hyun Inc.
F/V NORTHWEST	Harbor Refuse & Environm
F/V PAGO NO 1	Samoa Enterprises Inc.
F/V PAGO NO 2	Samoa Enterprises Inc.
F/V PAGO NO 3	Samoa Enterprises Inc.
F/V PENINA	Longline Services Inc.
F/V POHO NUI	Joseph/Maria Parisi
F/V POWAK	Quality Tuna Co.
F/V PRINCESS DANIELA	Afoa Lures
F/V PRINCESS MARLENE	Afoa Lures
F/V RIM REAPER	Hamilton Caldwell
F/V RJ	Lefanoga Eseroma
F/V SALVATION	Tagialisi Misa
F/V SALVATION II	Tagialisi Misa
F/V SAMOAN BOY	Feli Fisheries Inc.
F/V SEA BIRD	Seawind Fisheries Group
F/V SEAFA FISH LINE	Faiivae Galeai
F/V SIVAIMOANA	Tuna Ventures Inc.
F/V SKOOPY I	Omar Shallout
F/V SKOOPY II	Omar Shallout
F/V SOUTH WIND I	Elvin Mokoma
F/V SOUTH WIND II	Elvin Mokoma
F/V SOUTH WIND III	Elvin Mokoma
F/V SOUTH WIND IV	Elvin Mokoma
F/V TABITHA	Uelese Timoteo
F/V TAIMANE	Longline Services Inc.
F/V TAMARINA	Ioane Maselino
F/V TELEFONI	Telefoni Sagapolutele
F/V THE BOSS	The Boss Fishing Co.
F/V THE MARIA J	Maria J Fishing Inc.
F/V TIFAIMOANA	Longline Services Inc.
F/V TRACEY C	Tracey C Fishing LLC
F/V VAAOLEFAAOLATAGA	Pele Tui
F/V ZEPHYR	Coastal & Offshore Pac. Corp.

Guam

none

Northern Mariana Islands

none

D. Protected Species Conservation

The Hawaii longline fishery targeting swordfish and tunas has been monitored under a mandatory observer program since February 1994. Beginning March 1994, branch personnel have conducted daily shoreside dock rounds in Honolulu to determine which fishing vessels are in port. These dock rounds are used to obtain an estimate of fishing effort on a real-time basis by assuming that a vessel is fishing when it is absent from the harbor. Approximately 1,128 vessels departed port between January 1, 2002, and December 31, 2002, 278 of which carried observers, representing about 24.6% observer coverage. The following table summarizes protected species interactions for all observed trips that returned during calendar year 2002. Total observed fishing effort was approximately 6,786,303 hooks and 3,523 sets; 14 sea turtle and 9 marine mammal interactions were observed.

Olive ridley turtles were the species most often involved in observed interactions (Table 4) with longline gear, followed by loggerheads, then greens and leatherbacks. Of the 14 turtles observed taken, 5 were released alive or injured and 9 released dead (Table 4).

Table 4. Observed longline gear/turtle interactions, 2002

Turtle Species	Condition		
	Released Alive/Injured	Dead	Total
Loggerhead	3	1	4
Olive Ridley	0	7	7
Leatherback	2	0	2
Unidentified Hardshell	0	0	0
Green	0	1	1
Hawksbill	0	0	0
TOTAL	5	9	14

Table 5. Estimated fleet-wide turtle takes and kills in the Hawaiian longline fishery, 1994-2002

Species	Estimated Takes								
	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Loggerhead	501	412	445	371	407	369	246	18	19
95% CL	315-669	244-543	290-594	236-482	259-527	234-466	N.A.	N.A.	N.A.
Olive Ridley	107	143	153	154	157	164	113	36	31
95% CL	70-156	90-205	103-210	103-216	102-221	111-231	N.A.	N.A.	N.A.
Leatherback	109	99	106	88	139	132	132	10	6
95% CL	68-153	62-141	69-148	55-124	79-209	76-193	N.A.	N.A..	N.A.
Green	37	38	40	38	42	45	65	11	3
95% CL	15-65	15-70	19-70	14-73	18-76	18-82	N.A.	N.A.	N.A.

Species	Estimated kills								
	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Loggerhead	88	72	78	65	71	64	106	8	8
95% CL	36-141	31-115	34-127	28-102	32-112	28-102	N.A.	N.A.	N.A.
Olive Ridley	36	47	51	51	52	55	65	27	29
95% CL	8-64	7-84	11-90	8-92	11-92	11-96	N.A.	N.A.	N.A.
Leatherback	9	8	9	7	12	11	45	3	2
95% CL	0-22	0-21	1-21	0-18	1-28	1-27	N.A.	N.A.	N.A.
Green	5	5	5	5	5	6	35	8	3
95% CL	0-16	0-17	1-17	0-17	1-19	1-19	N.A.	N.A.	N.A.

Data from SWFSC Administrative Report H-00-06 and additional reports from PIFSC.
The take estimates for year 2000, 2001, and 2002 do not include 95% CL because uncertainty was computed under a different time scale based of the sampling protocol and different shifts in management regimes and regulations during the year.
*The year 2002 data is the first complete year of a single management regime for the fishery. Note that two loggerhead turtles were observed on illegally made swordfish sets in 2002.

Marine mammal and seabird interactions were also recorded by the observers and are summarized below in Tables 6 and 7.

Table 6. Observed longline gear/marine mammal interactions, 2002			
Marine mammal species	**Condition**		
	Released alive/injured	**Released dead**	**Total**
Monk Seals	0	0	0
Humpback whales	1	0	1
False killer whales	5	0	5
Unidentified Cetacean	2	0	2
Blainville's Beaked Whale	0	1	1
Dolphins	0	0	0
Total	8	1	9

Table 7. Observed longline gear/seabird interactions, 2002			
Seabird Species	**Condition**		
	Released alive/injured	**Returned dead**	**Total**
Black-footed albatross	1	17	18
Laysan albatross	3	13	16
Sooty Shearwater	0	0	0
Total	4	30	34

* In 2001, NMFS data did not differentiate between released alive and returned dead. Subsequently, all 2001 released alive seabirds were added to the Released Injured column of Table 7.

Concern for the numbers of albatross taken by the Hawaiian longline fleet has been an important concern for the NMFS Honolulu Laboratory. An observer coverage increase of over 300 percent since 1999 has increased the accuracy of the estimated takes.

Table 8. Estimated fleet-wide seabird takes in the Hawaiian longline fishery, 1994-2002									
Species	Estimated takes								
	1994	1995	1996	1997	1998	1999	2000	2001*	2002
Blackfoot albatross	1830	1134	1472	1305	1283	1301	272	58	18.4
95% CI	1457-2239	899-1376	1199-1811	1077-1592	1028-1601	1021-1600	212-373	N.A.	N.A.
Laysan albatross	2067	844	1154	985	981	1019	155	62	17.6
95% CI	1422-2948	617-1131	835-1600	715-1364	679-1360	688-1435	108-216	N.A.	N.A.

*Year 2000 was calculated as the time period between 25 August 2000 and 31 March 2001. Year 2001 was calculated as the time period between 1 July 2001 and 30 June 2002. 95% CI not provided for year 2001.

E. USCG Enforcement Activities

The United States Coast Guard (USCG) conducted roughly 800 hours of fisheries patrols with C-130 aircraft in the Central and Western Pacific ocean during fiscal year 2002. A balance in aerial surveillance effort was sought as well, yet during FY 2002, the majority of available C-130 resource hours were spent in support of the Homeland Security mission. The USCG deployed C-130s in response to intelligence cueing and increased fishing activity in close proximity to the non-contiguous EEZs. They conducted several C-130 deployments to American Samoa and Guam, with additional over-flights of Wake, Jarvis, Johnston, Howland-Baker, and Palmyra to monitor the Central and Western Pacific EEZs. Nevertheless, the need for flight hours to support the Maritime Homeland Security mission impacted their ability to deploy, and overall, there was a reduction in the total number of C-130 hours flown in support of fisheries enforcement.

The C-130 surveillance of the eight non-contiguous EEZ s was broken down as follows: 520 hours in the Main Hawaiian Islands, 8 hours in the Northwest Hawaiian islands, 105 hours in Guam and the Northern Mariana Islands, 56 hours in American Samoa, 15 hours in Palmyra Atoll/Kingman Reef, 49 hours in Jarvis Island, and 41 hours in Howland/Baker Islands.

In FY 2002, over 1300 cutter hours of fisheries patrol were conducted in the Central and Western Pacific ocean. The USCG provided only a minimal presence in the Central and Western Pacific EEZs, as they continued to balance efforts between fisheries enforcement operations throughout the region and post- September 11th Homeland Security missions in the vicinity of the Main Hawaiian Islands. There were almost 200 fishing vessel boardings in FY 2002. The breakdown of vessels boarded is as follows: 133 were U.S and 63 were foreign.

It is estimated that 89 EEZ encroachments by foreign fishing vessels occurred in FY 2002 and only three suspected violators were intercepted by Coast Guard units. The Coast Guard responded to several significant MFCMA violations by U. S. fishing vessels cued by the NMFS

Vessel Monitoring System in FY 2002, including:

- F/V Pacific Fin (US). On October 5, 2001, the F/V Pacific Fin was observed fishing inside the NWHI Protected Species Zone. A C-130 homeland security flight was diverted to verify/document the violation and confirmed the vessel was fishing in the closed area. The closed area violations were documented and a case package forwarded to NMFS for disposition.

- F/V Deborah Ann (US). In response to VMS cueing, Coast Guard conducted an overflight August 1, 2002, of the high seas area west of Palmyra Atoll. The C-130 reported sighting F/V Deborah Ann actively fishing in the high seas area prohibited to U.S. longline fishing by the South Pacific Tuna Treaty. The C-130 crew documented the violation using video. Master was hailed by radio and directed to stop fishing and depart the area. No surface assets were available to prosecute the case. A case package was forwarded to NMFS for disposition.

- F/V Long Men Yen (TW). During a law enforcement over-flight on August 1, 2002, with NMFS special agent onboard, a Coast Guard C-130 spotted the F/V Long Men Yen transiting the U.S. EEZ of American Samoa without fishing gear stowed. The C-130 crew documented the violation using video. No surface assets were available to prosecute the case. A case package was forwarded to NMFS for disposition.

FY2002 also saw a number of Federal Shark Finning Prohibition Act (SFPA) violations.

- F/V Universal No. 1 (BH). On March 6, 2002, the Coast Guard boarded the F/V Universal No. 1 in Guam and found four bags (approx 75 pounds each) of shark fin and approximately 12 shark carcasses onboard. Subject vessel was not permitted to target shark in the Federated States of Micronesia (FSM). The Boarding Officer made copies of fish logs, FSM permits, and took digital photos of subject vessel, steel leaders, and shark fins. A case package was forwarded to NMFS for disposition.

- F/V Universal No. 1 (BH). On April 12, 2002, the Coast Guard boarded the F/V Universal No. 1 and discovered two nylon bags containing shark fins. There were no corresponding carcasses onboard and the master's logs indicated no catch of shark. The Boarding Officer questioned the agent and was told that the fins were to be transferred to a refrigerated container and then shipped to Taiwan. The agent was notified that the vessel was in violation of 50 CFR 600.1023(C). At NMFS' request, Boarding Officer directed owner, agent, and master to seal the nylon bags and place them back in the fish hold. The Boarding Officer reminded owner/agent/master that the landing of shark fins without corresponding carcasses is a violation of U.S. federal law and that the shark fins were to remain onboard vessel until it departed the U.S. port. Boarding Officer issued an Enforcement Action Report (EAR) for violation of 50 CFR 660.1023(C) and confirmed the fins were onboard when the vessel departed Guam on April 15, 2002. A case package was forwarded to NMFS for disposition.

- F/V Sheng Man Fa No. 6 (TW) and F/V Shin Sheng Ching No. 111 (TW). Coast Guard

Marianas Section (Guam) law enforcement teams intercepted and seized 25,669 combined pounds of illegal shark fins from the F/V Sheng Man Fa No. 6 (10 Aug 02) and F/V Shin Sheng Ching No. 111 (12 Aug 02). Case packages were forwarded to NMFS for disposition.

There were numerous other violations documented on commercial fishing vessels in the region. Noteworthy was the steady number of manning violations detected on the longline fleet.

4. F/V Dae In Ho IV (US). On December 9, 2001, the Coast Guard boarded the F/V Dae In Ho IV and determined that the vessel was operating with a non-U.S. master. The person who claimed to be the master was not the one actually directing the activity of the vessel. The Boarding Officer seized the vessel's Certificate of Documentation (COD) and issued a Notice of Violation (NOVA) for the violation (46CFR67.167(B)). NMFS had earlier reported that the vessel may be operating with an illegal master and that the vessel's fish logs were being signed prior to the vessel getting underway. The Boarding Officer confirmed that for a previous voyage someone not on board the vessel had signed the fish logs. The Owner was issued a NOVA for falsifying fish logs (50CFR660.22(B)). A case package was forwarded to NMFS for disposition.

5. F/V Capt. Millions IV (US). On March 1, 2002, the Coast Guard boarded the F/V Capt. Millions IV and determined the vessel was operating with a non-U.S. master. Conflicting statements of crew and boarding team observations led the Boarding Officer to the conclusion that the actual master was a Vietnamese citizen with resident alien documentation. After consultation with NMFS special agent, master was cited under 46 USC 8103 for command of a U.S. vessel by an alien. EAR was issued for violation of Pelagic Fisheries Management Plan. The Boarding Officer seized the vessel's COD and issued a NOVA for the violation (46CFR67.167(B)). A case package was forwarded to NMFS for disposition.

6. F/V Taimane (US). On May 25, 2002, the voyage of the F/V Taimane was terminated when the boarding team determined the vessel was operating with a non-U.S. master. A case package was forwarded to NMFS for disposition.

The Coast Guard participated in a series of engagement operations with our international fisheries enforcement counterparts. The Pacific island countries involved included Australia, Palau, Kiribati, the Federated States of Micronesia, the Marshall Islands, and Samoa. In one highly successful operation, titled Operation PACIFIC COMPASS, the Coast Guard completed multi-faceted international engagement visits with several Pacific island nations. The engagements consisted of Coast Guard and NMFS personnel participating in professional exchange with local marine police, fisheries personnel, and maritime service officials. Simultaneously, a Coast Guard C-130 aircraft conducted orientation flights to demonstrate the benefits of aerial surveillance to maritime operations.

F. NOAA Fisheries Office for Law Enforcement Southwest Enforcement Division

Magnuson Act Enforcement Actions
There was four prominent enforcement actions resulting from violations of the MSFCMA which have resulted in financial penalties totaling $143,817.81. Six Summary Settlements totaling $2800 were issued between October 2002 and January 2003. Three of these incidents involved failing to provide 72 hours advance notice of departure in the pelagic longline fishery. Other violations documented ranged from possession and use of float lines less than 20 meters in length, the direct targeting of swordfish, and various logbook and reporting infractions, to violation of the Shark Finning Prohibition Act.

The Southwest Enforcement Division continued to investigate violations of the new Shark Finning Prohibition Act that involved nearly 46 tons of shark fin. Thirty-two tons of shark fin were seized in San Diego that were prepared for public auction, and 13 tons of fin were seized in Guam where shark fins exceed five percent of the corresponding carcasses landed, and several smaller cases in Honolulu.

There has been a steady increase in the number of referrals from the Honolulu Observer Program office. NOAA OLE dealt with the referrals through a combination of enforcement actions that included education letters, Fix-It Notices, Summary Settlement actions, and investigations that was forwarded to the Office of General Counsel. The most commonly reported infractions included short float lines, luminescent gear, failure to use blue-dyed bait north of 23 degrees North latitude, failure to completely thaw bait, failure to provide 72 hours advance notice of departure to the Observer Program, and failure to comply with seabird mitigation measures.

One closed area violation was being investigated as the result of a partial set in the Main Hawaiian Island Closed Area.

Marine Mammal Protection Act:
Public education, deterrence, and intervention remained the primary focus of NOAA Fisheries Office for Law Enforcement with regards to averting marine mammal harassment within Hawaii. Moreover, coordination continued with volunteer organizations and local law enforcement agencies, in order to provide a timely response to marine mammal incidents.

There was several reports of swimmers, kayaks, and power vessels interfering with pods of spinner dolphins off Oahu, Maui, and the Big Island. Investigations and public education actions were initiated.

Marine Sanctuaries Act:
With the advent of the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, the NOAA Office for Law Enforcement committed the resources of a special agent, full-time, to address the unique enforcement challenges of the reserve.

The NOAA OLE resumed partnership with the Hawaiian Islands Humpack Whale National Marine Sanctuary and had an enforcement officer co-located at the sanctuary office in Kihei

throughout the whale season. They have responded to a number of complaints. The high visibility of the uniformed officers has greatly enhanced their program to promote responsible viewing of marine wildlife. In the 2002-2003 season, the entire range of possible approach violations for humpback whales in the sanctuary were encountered. Complaints have included swimmers, kayaks, power boats, water skiers, dive boats, and other commercial vessels.

Endangered Species Act:
There was two prominent enforcement actions resulting from violations of the Endangered Species Act, affecting sea turtles in Hawaii. Financial penalties totaling $9,600.00 resulted. Violations ranged from failing to carry line clippers and dip nets, to illegal takes with prohibited fishing gear.

In addition, the NOAA Office for Law Enforcement responded to over 60 complaints involving violations of the humpback whale approach regulations by recreational water craft, swimmers, and aircraft from January through April of 2002.

The increased sightings and natural human curiosity when encountering the endangered Hawaiian Monk Seal generated reports of interactions and harassment on Kauai, Maui, and Molokai. NOAA OLE responded to a number of reported sighting/incidents, but are most often confronted by curious onlookers who have been extremely receptive to learning more about responsible wildlife viewing.

Forum Fisheries Agency:
The Southwest Enforcement Division continued to provide technical and investigative support to the Forum Fisheries Agency and its member countries. The Assistant Special Agent in Charge attended the Fifth Monitoring Control and Surveillance Working Group Meeting, hosted by the FFA, in Majuro, RMI. The development of a draft Monitoring Control and Surveillance (MCS) strategy for the convention area, as well as counter-strategies for illegal, unreported and unregulated (IUU) fishing activities were central topics.

Vessel Monitoring System
Throughout this reporting period, NOAA Fisheries OLE-Southwest Enforcement Division continued to coordinate efforts and to assist NOAA OLE Headquarters in the development of a national oversight strategy for the VMS program, based upon regional emphasis. Comprehensive planning and strategy meetings have taken place. In addition, development continues on a structured training curriculum for managers in the VMS program.

The Hawaii VMS Program continued to demonstrate how a fishing vessel monitoring system can be an effective use of technology to improve the monitoring and control of regulated fisheries. VMS, in conjunction with air and surface patrols, promoted and supported regional strategies for conservation and management of highly migratory species in the Pacific.

The VMS Manager reported that there had been three new entrants in the pelagic longline fishery. All vessels had been engaged in longline fishing in other areas, but now had VMS units installed to participate in the Honolulu-based fishery.

The VMS Control Center continued to run smoothly, with software and hardware upgrades.

Miscellaneous

The NOAA Special Agent stationed on Guam continued to engage in cooperative enforcement efforts with the Federated States of Micronesia (FSM) and Papua New Guinea (PNG) to assure compliance by foreign fishing vessels of their access agreements in those countries.

The Fisheries Enforcement Advisor position was staffed by Special Agent Kevin Painter.

Appendix 1

American Samoa

Introduction

The pelagic fishery in American Samoa has historically been an important component of the traditional domestic fisheries. Prior to 1995 the pelagic fishery was largely a troll-based fishery. The horizontal method of longlining was introduced to the Territory by Western Samoan fishermen in 1995. The local fishers have found longlining to be a worthwhile venture to engage in because they land more pounds with less effort and use less gas for trips. Almost all of the vessels used are "alias". These are locally built, twin-hulled (wood with fiberglass or aluminum) boats about 30 feet long, powered by 40HP gasoline outboard engines. Navigation on the alias is visual, using landmarks with the exception of a few modernized alias which have global positioning systems (GPS) for navigation. The gear is stored on deck attached to a hand-crank reel which can hold as much as 10 miles (25 miles for the jig-boat) of monofilament mainline. The gear is set by spooling the mainline off the reel and retrieved by hand pulling and cranking the mainline back onto the reel. Trips are usually one day long (about 8 hours) for some boats, however for most boats actively fishing, multiple trips are made from two days and possibly more. These boats at 40 feet or so are slightly bigger than the regular alia. Setting the equipment generally begins in the early morning. Haulback is generally in the mid-day to afternoon. The catch is stored in containers secured to the deck, or in the hulls. Albacore is the primary species caught, and is generally stored in personal freezers until a sufficient amount is accumulated to sell to the canneries. Some of the catch is also sometimes sold to stores, restaurants, local residents and donated for family functions.

In mid-1995 five alias began longlining. This number grew to 12 boats involved in longline fishing in 1996. In 1997, 33 vessels had permits to longline of which 21 of those were actively fishing on a monthly basis. Also, in 1997 the first longline vessel of 60 plus feet in length capable of making multi-day trips began operating in American Samoa. In 1998, 50 local vessels received federal permits to longline but only 25 did longline. Fifty-nine local vessels received federal permits in 1999 to longline but only 29 participated in the longline fishery. In 2000, 37 vessels were active in the longline fishery. In the last half of 2000 the number of larger multi-day longline boats operating in American Samoa grew dramatically to over a half a dozen. In 2001, the number of vessels participating in the longline fishery increased dramatically by 68%, whereas the number of vessels participating in the trolling fishery slightly decreased by 5%. Conversely, in 2002, 58 boats participated in the longline and 15 boats maintained their trolling activities. This depicts a decrease in the number of vessels landing any catch of pelagic species from this year.

Prior to 1985, only commercial landings were monitored. From October 1985 to the present, data was collected through an offshore creel survey that included subsistence and recreational fishing as well as commercial fishing. In September, 1990 a Commercial Purchase (receipt book) System was instituted in which all businesses in Samoa, except for the canneries, that buy fish commercially were required by local law to submit to DMWR a copy of their purchase receipts. In January 1996, in response to the developing longline fishery a federal longline logbook system was implemented. All longline fishermen are required to obtain a federal permit which requires them to submit logs containing detailed data on each of their sets and the resulting catch. From 1996 to 1999, the logbooks submitted by the local longliners were edited in Samoa for any missing data and were then sent to the NMFS Honolulu Lab every

week for further editing and data processing. Starting with 2000, logbook data was entered and maintained in Samoa and downloaded to NMFS in Hawaii periodically.

On July of 1999, In response to a problem with delinquent longline logs, the Department of Marine and Wildlife initiated a Daily Effort Census (DEC) program to monitor the local longline fleet. Using the Daily Effort Census form, which contains all active longline vessels, data collectors go out on a daily basis, except on Sundays, Holidays, and off-duty days, to check which boats are out longlining and which boats are in port. The DEC form is returned to DMWR for data entry at the end of each working day. Federal logbooks are required to be submitted to DMWR by the following Monday after each fishing trip. If they are not, warnings are issued to the fishermen and more punitive measures are taken if these warnings are not heeded.

Toward the end of 2000 many new multi-day trip boats joined the longline fleet making it hard to tell what they were doing when they were not in port. To solve this problem the longline logbook data was compared with reports from the canneries of fish unloaded by these boats to identify which boats were delinquent in their longline logs and to take corrective action.

Newly discovered "peculiarities" in the historical data, the emergence of new, bigger boats that make multi-day trips required amending and supplementing the algorithms that expand American Samoa's offshore creel survey data. WPacFIN staff have completed modifications to the Visual FoxPro data processing system to address these data concerns to better reflect the status of the territory's pelagic fisheries. These changes are outlined below. The data from 1982-1985 has been left unchanged from the Dbase IV Commercial Catch Monitoring System but data from 1986-2002 in this report has been re-expanded with the new Visual FoxPro data processing system. These expansions are true annual expansions of the entire year's interviews across the entire year's sample days and are no longer sums of 12 monthly expansions. Note that there are some changes to the historical data due to the new re-expanded and adjusted data. As a result, the graph presentations have also changed.

Total landings data covers all fish caught and brought back to shore whether it enters the commercial market or not. Commercial Landings covers that portion of the Total Landings that was sold commercially in Samoa both to the canneries and other smaller local business that buy fish. Total landings include both the commercial and recreational/subsistence components of the fishery. Commercial Landings data from 1982-1985 was imported from the Commercial Catch Monitoring System without change. From 1986 to 1990, the estimated total landings and estimated commercial landings data was taken from the Offshore Creel Survey System expansion.

One of the problems with the offshore creel survey was that spear fishing and bottom fishing trips are usually done at night. These boats came in early in the morning before the interviewers were on duty resulting in very few interviews for these types of trips. These fishermen still had to sell their fish so starting in 1991 the Commercial Purchase System provided information on what they caught. From 1991 to present the Offshore Creel Survey landings were replaced by Commercial Purchase System landings for species where the Commercial Purchase System landings exceeded the Offshore Creel Survey landings. This happens most often with swordfish and dogtooth tuna.

Until 1995 all trips where interviews were not obtained were put in the "unknown" fishing method category. For all of the trips where interviews were obtained a percentage of trips by fishing method was calculated. The unknown trips were then divided up by this percentage and added to the interviewed trips. Since most of these unknown trips were bottomfishing and

spearfishing trips and very few real interviews for these fishing methods were obtained, these two fishing methods were under represented in the offshore creel survey expansion.

Since the vessels involved in these unknown trips was known and since certain boats only engaged in certain fishing methods, their fishing method could be changed from unknown to some known method. From 1995 and after this was done except for vessels engaging in multiple fishing methods at the same time. The fishing method for these remained unknown. The number of unknown fishing trips was greatly reduced and the bottomfishing and spearfishing trips became better represented in the offshore creel survey.

In 1997 the first vessel to make multi-day trips started operating in Samoa. It unloaded only at the canneries and if an interview could be obtained it would be hard to fit its data into the offshore creel survey system which was designed for vessels making one day trips. Toward the end of 2000 six more vessels joined this category known as non-interviewed vessels. Fortunately all of these larger non-interviewed vessels are required to submit longline logs. The longline log record of kept fish from these non-interviewed vessels was added to the longline total landings from interviewed vessels in the offshore creel survey system.

From 1997 to 2000, the entire logbook kept catch of wahoo, albacore, bigeye, skipjack and yellowfin tuna by the non-interviewed vessels was assumed to have been sold to the canneries and was added to the commercial landings at canneries prices obtained from the creel survey system. All other species of kept fish in the longline logs of non-surveyed vessels was treated as unsold and were only added to the total landings. Starting in 2001, the disposition of fish kept by the non-surveyed vessels became available from Cannery Sampling Forms. From these Cannery Sampling Forms a percentage of each species that were sold locally, sold to the canneries, or not sold could be calculated for the year and applied to the entire non-surveyed catch. This allowed the proper percentages of each species to be added to the commercial landings with either the canneries price/pound or the local price/pound.

These Cannery Sampling Forms also listed the lengths of individual fish from which their weights can be calculated. They started in 1998 listing only albacore lengths but in 2001 they listed lengths of other species as well. The weight per fish for the non-surveyed vessels was first taken as the monthly average of the cannery sampling data if there were at least 20 samples for a month. It was then taken as the annual average of the cannery sampling data if there were at least 20 samples for the year. If there wasn't enough cannery samples for a species, the weight per fish was calculated from the offshore creel survey data on a monthly basis where there were 20 or more samples or on a yearly basis. If there weren't 20 samples for a year a default value of weight per fish was obtained by averaging all of the offshore creel survey data or by manually entering a value.

In 1999 vessels emerged that made 3-5 day trips and could still be interviewed. Since the interview data is generally better than log data, these vessels are treated like normal interviewed vessels in the offshore creel survey system but their catch is divided by the number of sets they made during their multi-day trips.

Starting in 1999, many of the longline boats began landing their catches gilled and gutted to obtain higher prices at the canneries. The offshore creel survey system was modified to calculate appropriate round weights from the non-round weight using standard conversion factors for all species.

Starting in 2000, many interviewers started recording the length of the larger fish rather than trying to weigh them. The offshore creel survey system was modified to calculate appropriate round weights from the length measurements using a standard regression formula.

Starting in 2001 the method of determining price/pound was revised. Before 2001 price/pound was determined by averaging offshore creel survey data. This sometimes resulted in 4-5 samples, some of which were erroneous determining the price per pound for an entire species for a year. In 2001, the price per pound for fish sold locally in Tutuila was first determined by averaging the Commercial Purchase System (Receipt Book) data for each month. For months and species without any monthly data an annual average price/pound value from the receipt book data was used. If there was no annual average from the receipt book data a monthly average of the offshore creel survey data was calculated for each of three price/pound categories; Tutuila-Local, Manua_local and Cannery. Again if there was no monthly samples available for a given month, species and category an annual average of creel survey data was used. In cases where there was no creel survey data for a species and category for a year a value was entered manually. Values were also entered manually to override calculated values that were determined to be erroneous.

The "other pounds" category in Table 1 includes pelagic species not caught by longlining or trolling. Examples are as barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods. In addition, "other sharks" as it is identified on Table 1, categorizes all species of sharks that could and could not be identified by the fishermen.

The Offshore Creel Survey System showed almost no By-Catch species during 2002 thus the bycatch for longlining was assumed to be the released species in the longline logbook system. In addition, the number of bycatch has impressively increase for this year. There were no fishing tournaments held during 2002.

The island of Tutuila is also a major base for the trans-shipment and processing of tuna taken by the distant-waters longliner and purse seine fleets. The domestic pelagic fishery is monitored by the Department of Marine and Wildlife Resources (DMWR), through a program established in conjunction with the Western Pacific Fishery Information Network (WPacFIN). This report was prepared by DMWR using information obtained and processed as explained above. Except for the last figure (figure 22) it does not contain data on distant-waters landings at the canneries

With the increase of the longline fishery since its development, many different-size vessels have entered the fisheries, especially 2001. For this latest report (2002), the following tables have been included to better represent effort & catch, bycatch percentages, and CPUE for the different-size vessels:

- Table 3 & 4 represents longline effort and catch
- Table 5 represents longline bycatch percentages
- Table 7 represents longline catch per 1000 hooks
- Table 8 has been modified to include the cannery sampling average weight per fish.

Summary

In the year 2002, there was a 92% increase in the total landings for tuna and a 101% increase in the total landings for other pelagic species. Longlining constituted approximately 99.8 % of the total landings whereas trolling constituted .16 % of landings recorded. All in all, there has been an increase in the total landings for all tuna species and other pelagic species caught using the longline method. However, 2002 indicated that this could be a reflection from the decrease in the number of the vessels landing their catch in American Samoa. Similarly, this decrease can be the result of the continuous decline in the average inflation-adjusted price for all pelagic species (Figure 21). Despite the decline in prices, the total number of commercial landings for 2002 tremendously increased to about 93% yielding a revenue of $13,737,300.00 (Table 2).

During 2002, 58 boats engaged in the longline fishery of American Samoa whereas 15 boats participated in the trolling fishery. This depicts a 6% decrease from the 62 boats that participated in 2001 and just about three boats less still undergoing trolling activities. Albacore continues to be the target species contributing 83% of the total landings with 13,104,279 pounds. According to the two monitoring programs (Longline Logbook and Offshore Creel survey) there has been a general increase of approximately 126% in the number of hooks set compared to the number of hooks set in 2001. The Longline Logbook indicated 13,077 hooks set in 6,861 sets fishing for 126,815 hours of effort, whereas the Creel survey further indicated 13,219 hooks set in 7,419 sets for 122,902 hours. Longline catch per 1000 hooks by alias, monohull (<50ft.), and monohull (>50 ft.) are 38, 31, and 38 respectively. Trolling catch rates varied since 1982 with a steady decrease since 1999 to the present. This trend may reflect the increase in effort of longline fishing method used by local fishermen during this period. Overall, the longline fishery has been growing since 1995. This year has shown remarkable increase in pounds landed for almost all pelagic species, mostly by longline method and promises to keep growing in the future.

2001 Recommendations and **current status**:

1. The Plan Team recommended that NMFS expedites the 50 nm closed area for pelagic fishing vessels > 50ft. around the islands of American Samoa due to the increase in the number of large longline boats currently operating in the fishery and likely continued expansion of large longline vessels based in the territory.
   The final rule on the 50 nm closure around the islands of American Samoa has been implemented through the final ruling issued in the federal register on January 30, 2002.

2. The Plan Team encouraged the development of a limited entry program for the American Samoa Longline Fishery as an additional precautionary management measure.
   The Council has taken final action and is awaiting the final rule on the federal register.

3. The Plan Team recommended that an investigation of the spatial and temporal dynamics of longline fishing around American Samoa using existing historical data sets.
   This recommendation was proposed as a PFRP project but rejected. However, it shall remain as a continuous recommendation.

4. The Plan Team recommended the investigation of the practicalities of an observer program for the American Samoa longline fishery based on costs, vessel suitability and expected benefits.
The implementation of the observer program for the Longline Fishery in American Samoa is in its initial stages.

5. The Plan Team recommended that more shore-side data collection be conducted on albacore, such as sampling gonad and collecting size frequencies.
Progress to this recommendation has been underway however, it has been identified by the Plan Team that there are adequate information already collected.

6. The Plan Team recommended that more collaborative research and management initiatives be developed between the American Samoa DMWR and the Western Samoa Fisheries Division, given that the combined landings from both longline fisheries produce 15-20% of the albacore caught in the southern Pacific Ocean, and may be representative of the stock as a whole.
There has been progress to this recommendation, however the Plan Team feels if this recommendation is to be carried out, the catch for the two samoas would produce approximately 30% in the southwest region. Therefore it should remain a recommendation.

7. The Plan Team recommended that a survey of the longline gear used by American Samoan fishermen be made as soon as possible, given the ban by the recent NMFS Biological Opinion on the use of shallow set longline gear in the northern Pacific by fisheries under Council jurisdiction.
This recommendation has been established by WPacFin and its currently an ongoing process. A report of the results from this survey is available of the WPacFin website.

8. The Plan Team recommended that protected species workshops be conducted for American Samoa longline fishermen comparable to those held in Hawaii.
Workshops have been held and facilitated by members of PIAO and Fini Aitaoto (Local Office Council Coordinator) for the local fishermen.

9. The Plan Team noted with approval the suggested schedule for developing Pelagics FMP amendment implementing a limited entry program for the American Samoa longline fishery.
The limited entry program has been established for the American Samoa Longline Fishery and all its amendments are included in this management measure.

2002 Recommendations:

1. The Plan Team recognizes the importance of the presence of an Observer Program for the American Samoa Longline Fishery, thus the team recommends that NMFS fully fund this program. It was identified by the team that this should be a priority in order to document the disposition and condition of all fish released from the fishery. The large number in bycatch has become an issue and could be a potential problem for this expanding fishery if this program does not go forward. Although it is less reliable, logbook data should be considered augmenting observer data in the absence of an observer program.

2. The Plan Team recommends holding informative workshops for boatowners and fishermen explaining to them the importance of obtaining this information, how to accurately fill in the information and benefits they can receive through accurately filling out this information e.g Longline Logbook. This may help reduce the amount of data complication and develop better relationships between boatowners/fishermen and DMWR data collectors.

3. The Plan Team recommends that the National Marine Fisheries Service (NMFS) or the PFRP (Pelagic Fisheries Research Program) perform a study on the spatial and temporal dynamics of longline fishing around American Samoa using existing historical data sets.

4. The Plan Team recommends that more collaborative research and management initiatives be developed between the American Samoa Department of Marine and Wildlife Resources (DMWR) and the Western Samoa Fisheries Division, given that the combined landings from both longline fisheries produce about 30% of the albacore caught in the southern Pacific Ocean, and may be representative of the stock as a whole.

5. The Plan Team recommends NMFS and/or PFRP to conduct research on post-release mortality of bycatch in American Samoa.

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Table 1. American Samoa 2002 estimated total landings of pelagic species by gear type.

Species	LongLine Pounds	Troll Pounds	Other Pounds	Total Pounds
Skipjack Tuna	509,232	11,033	0	520,265
Albacore	13,104,279	0	0	13,104,279
Yellowfin Tuna	1,067,491	12,107	0	1,079,598
Kawakawa	0	95	0	95
BigeyeTuna	431,711	0	0	431,711
Tunas	396	0	0	396
TUNAS SUBTOTALS	15,113,108	23,235	0	15,136,343
Mahimahi	85,857	656	0	86,513
Black marlin	2,250	0	0	2,250
Blue marlin	74,257	0	0	74,257
Striped Marlin	3,850	0	0	3,850
Wahoo	357,880	358	0	358,238
Other Sharks	6,021	215	304	6,540
Swordfish	37,101	0	0	37,101
Sailfish	7,064	0	0	7,064
Spearfish	3,033	0	0	3,033
Moonfish	6,762	0	0	6,762
Oilfish	731	0	0	731
Pomfret	2,683	0	0	2,683
OTHER PPMUS SUBTOTALS	587,489	1,229	304	589,022
Barracudas	1,865	606	938	3,409
Rainbow runner	317	85	751	1,154
Dogtooth tuna	541	80	192	812
Other Pelagic Fish	2,019	0	0	2,019
MISC SUBTOTALS	4,741	771	1,881	7,394
TOTAL PELAGICS	**15,705,339**	**25,235**	**2,185**	**15,732,759**

The "troll pounds" category includes the pelagic landings of combined troll/bottomfishing trips as well as the landings of purely troll trips. The "other pounds" category in Table 1 includes pelagic species not caught by longlining or trolling such as barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods.

Table 2. American Samoa 2002 estimated commercial landings, value and average price of pelagic species.

Species	Pounds	$/LB	Value($)
Skipjack Tuna	427,911	$0.67	$287,350
Albacore	13,094,940	$0.89	$11,613,681
Yellowfin Tuna	1,042,574	$0.95	$988,970
Kawakawa	42	$2.64	$110
BigeyeTuna	396,104	$1.12	$444,765
TUNAS SUBTOTALS	14,961,570	$0.89	$13,334,876
Mahimahi	35,442	$1.78	$63,207
Black marlin	1,267	$1.00	$1,267
Blue marlin	42,473	$1.02	$43,214
Wahoo	276,163	$1.01	$277,725
Other Sharks	1,122	$0.50	$561
Swordfish	3,431	$2.16	$7,418
Sailfish	1,741	$1.08	$1,883
Spearfish	607	$1.50	$910
Pomfret	351	$1.98	$695
OTHER PPMUS SUBTOTALS	362,597	$1.09	$396,880
Barracudas	2,212	$1.38	$3,048
Rainbow runner	1,138	$1.75	$1,989
Dogtooth tuna	248	$2.05	$507
MISC SUBTOTALS	3,598	$1.54	$5,544
TOTAL PELAGICS	**15,327,765**	**$0.90**	**$13,737,300**

Table 3. American Samoa 2002 Longline Effort, Kept and Released by the Three Sizes of Vessels

EFFORT

	Alias	Monohull < 50'	Monohull > 50 '
Boats	27	5	29
Sets	1,400	637	4,824
1000 Hooks	436	970	11,671
Lightsticks	327	1,311	2,136

KEPT (Number of Fish)

Species	Alias	Monohull < 50'	Monohull > 50 '	All Vessels
Skipjack Tuna	2,563	412	42,379	45,354
Albacore	7,449	22,432	302,534	332,415
Yellowfin Tuna	3,074	774	13,439	17,287
BigeyeTuna	254	358	8,524	9,136
Tunas	0	0	24	24
TUNAS SUBTOTALS	13,340	23,976	366,900	404,216
Mahimahi	1,741	603	3,291	5,635
Black marlin	0	0	10	10
Blue marlin	98	52	269	419
Striped Marlin	23	4	31	58
Wahoo	1,154	785	9,698	11,637
Other Sharks	3	6	71	80
Swordfish	47	33	219	299
Sailfish	24	3	55	82
Spearfish	8	2	64	74
Moonfish	36	16	132	184
Oilfish	10	8	44	62
Pomfret	7	13	250	270
OTHER PPMUS SUBTOTALS	3,151	1,525	14,134	18,810
Barracudas	2	1	53	56
Other Pelagic Fish	1	1	41	43
MISC SUBTOTALS	3	2	94	99
TOTAL PELAGICS	**16,494**	**25,503**	**381,128**	**423,125**

RELEASED (Number of Fish)

Species	Alias	Monohull < 50'	Monohull > 50 '	All Vessels
Skipjack Tuna	0	1,656	17,275	18,931
Albacore	0	56	725	781
Yellowfin Tuna	0	187	2,002	2,189
BigeyeTuna	0	65	2,533	2,598
Tunas	0	20	18	38
TUNAS SUBTOTALS	0	1,984	22,553	24,537
Mahimahi	0	282	3,252	3,534
Black marlin	0	1	48	49
Blue marlin	0	148	3,169	3,317
Striped Marlin	0	0	370	370
Wahoo	0	220	2,071	2,291
Other Sharks	4	1,268	9,159	10,431
Swordfish	0	11	209	220
Sailfish	0	7	264	271
Spearfish	0	15	199	214
Moonfish	0	56	675	731
Oilfish	0	241	6,043	6,284
Pomfret	0	14	777	791
OTHER PPMUS SUBTOTALS	4	2,263	26,236	28,503
Barracudas	0	1	1,006	1,007
Other Pelagic Fish	0	51	3,125	3,176
MISC SUBTOTALS	0	52	4,131	4,183
TOTAL PELAGICS	**4**	**4,299**	**52,920**	**57,223**

Interpretation: This table indicates the effort and catch data by three different types of vessels participating in the American Samoa longline fishery in the year 2002. Clearly it illustrates that the majority of the effort and catch is performed by the monohulls that are greater than 50 ft. in length. It accounts for 90% of the total pelagics caught, compared to the 6 % by the monohulls less than 50 ft. and 3.8% by the alias.

Calculation: These values are sums of Longline Logbook data for the three types of longline vessels in Samoa. The kept values for sharks include those that were finned. All species of sharks entered in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

Table 4. American Samoa 2002 Longline Effort and Catch
By Boats < 50' Long and > 50' Long Inside and Outside of areas 50 miles from shore

EFFORT

	Boats < 50' Inside	Boats < 50' Outside	Boats > 50' Inside	Boats > 50' Outside
Boats	32	5	25	29
Sets	1,674	363	343	4,481
1000 Hooks	827	579	836	10,834

CATCH (Number of Fish)

Species	Boats < 50' Inside	Boats < 50' Outside	Boats > 50' Inside	Boats > 50' Outside
Skipjack Tuna	3,332	1,299	1,984	57,670
Albacore	15,662	14,275	17,330	285,929
Yellowfin Tuna	3,405	630	604	14,837
BigeyeTuna	413	264	261	10,796
Tunas	0	20	0	42
TUNAS SUBTOTALS	22,812	16,488	20,179	369,274
Mahimahi	2,218	408	329	6,214
Black marlin	1	0	5	53
Blue marlin	177	121	274	3,164
Striped Marlin	26	1	14	387
Wahoo	1,589	570	615	11,154
Other Sharks	548	733	791	8,439
Swordfish	64	27	23	405
Sailfish	26	8	8	311
Spearfish	10	15	11	252
Moonfish	57	51	54	753
Oilfish	122	137	296	5,791
Pomfret	13	21	30	997
OTHER PPMUS SUBTOTALS	4,851	2,092	2,450	37,920
Barracudas	4	0	35	1,024
Other Pelagic Fish	26	27	103	3,063
MISC SUBTOTALS	30	27	138	4,087
TOTAL PELAGICS	**27,693**	**18,607**	**22,767**	**411,281**

Interpretation: This table shows the longline effort and catch by boats less than and greater than 50 feet in length inside and outside the 50 miles from shore. Albacore continues to be the most commonly caught species inside and outside of the 50 mile areas regardless of boat size. In addition, the amount of effort put into the fishery by each size class boats yielded more fish caught by the smaller boats (< 50 ft.) inside the 50 miles whereas the larger boats caught more outside the 50 miles. However, because larger boats > 50 ft. have been banned from inside the 50 nm since March 2002, the comparison isn't obvious.

Calculation: These values are sums of Longline Logbook catch (kept + released + finned) data for longline vessels in Samoa that are less than 50 feet long and more than 50 feet long. The less than 50 foot category includes alias and monohulls less than 50 feet long. The 50 mile areas include one around Tutuila bounded by the following four points

13 deg 30 min S latitude x 170 deg 49min 42 sec W longitude
13 deg 30 min S latitude x 167 deg 30min W longitude
15 deg 30 min S latitude x 167 deg 30min W longitude
15 deg 30 min S latitude x 171 deg 51min W longitude

and one around Swains's Atoll bounded by the following four points

10 deg 38 min S latitude x 170 deg 40min W longitude
11 deg 28 min S latitude x 170 deg 40min W longitude
11 deg 28 min S latitude x 171 deg 30min W longitude
10 deg 38 min S latitude x 171 deg 30min W longitude

A set is considered inside one of these areas if any of the begin set, end set, begin haul or end haul positions is inside one of these areas. All species of sharks entered in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

Table 5A. American Samoa 2002 Longline Logbook Bycatch Percentages for the Three Sizes of Longline Vessels

Species	Alias	Monohulls < 50'	Monohulls' > 50 '	All Boats
Skipjack Tuna	0.00 %	80.08 %	28.96 %	29.45 %
Albacore	0.00 %	0.25 %	0.24 %	0.23 %
Yellowfin Tuna	0.00 %	19.46 %	12.97 %	11.24 %
BigeyeTuna	0.00 %	15.37 %	22.91 %	22.14 %
Tunas	0.00 %	100.0 %	42.86 %	61.29 %
TUNAS SUBTOTALS	0.00%	7.64%	5.79%	5.72 %
Mahimahi	0.00 %	31.86 %	49.70 %	38.54 %
Black marlin	0.00 %	100.0 %	82.76 %	83.05 %
Blue marlin	0.00 %	74.00 %	92.18 %	88.78 %
Striped Marlin	0.00 %	0.00 %	92.27 %	86.45 %
Wahoo	0.00 %	21.89 %	17.60 %	16.45 %
Other Sharks	57.14 %	99.53 %	99.23 %	99.24 %
Swordfish	0.00 %	25.00 %	48.83 %	42.39 %
Sailfish	0.00 %	70.00 %	82.76 %	76.77 %
Spearfish	0.00 %	88.24 %	75.67 %	74.31 %
Moonfish	0.00 %	77.78 %	83.64 %	79.89 %
Oilfish	0.00 %	96.79 %	99.28 %	99.02 %
Pomfret	0.00 %	51.85 %	75.66 %	74.55 %
OTHER PPMUS SUBTOTALS	0.13%	59.74%	64.99%	60.24 %
Barracudas	0.00 %	50.00 %	95.00 %	94.73 %
Other Pelagic Fish	0.00 %	98.08 %	98.70 %	98.66 %
MISC SUBTOTALS	0.00%	96.30%	97.78%	97.69 %
TOTAL PELAGICS	**0.02%**	**14.43%**	**12.19%**	**11.91 %**

Table 5B. American Samoa Trolling Bycatch

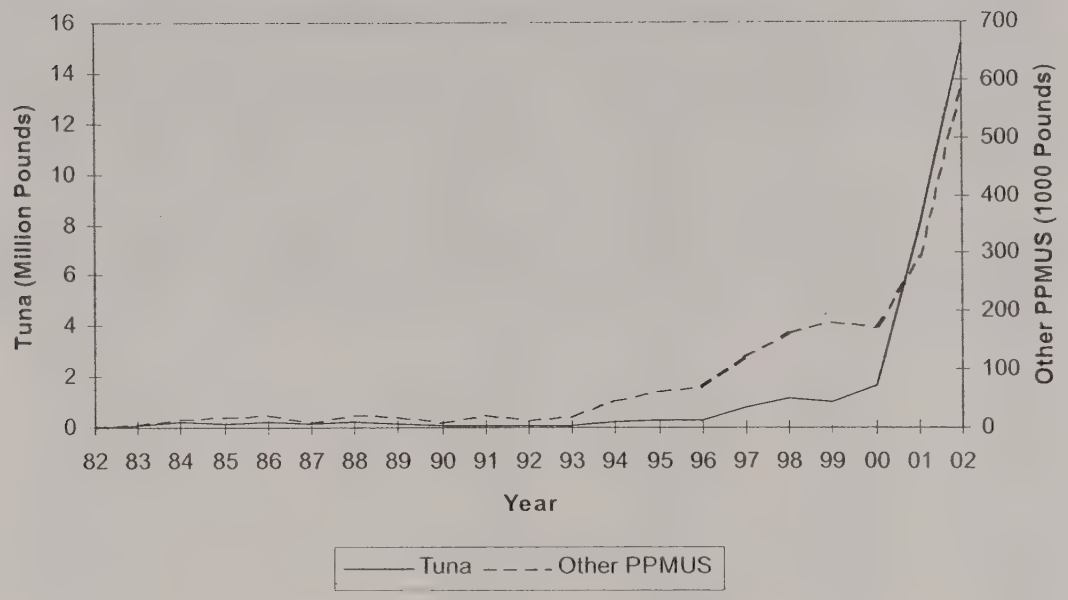
	Bycatch						Interviews		
Species	Alive	Dead Inj	Unk	Total	Catch	%BC	With BC	All	%BC
No Bycatch							0	305	0.00
All Species (Comparison)					1482	0.00			

Interpretation: This table shows longline and trolling bycatch percentages for the three different sizes of longline vessels in 2002. Table 5B shows no bycatch for the trolling method during this period.

Calculation: The percentages in Table 5A are sums of the Longline Logbook numbers of released fish divided by the sums of the numbers of kept+released released fish for each species and size of vessel. For shark species the numbers of fish kept includes those finned. The percentages for all boats is the sum of released species for all boats divided by the sum of kept plus the sum of released for all boats. The percentages in the SUBTOTALS and TOTALS row are similarly weighted percentages. All shark species in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

The Trolling Bycatch table is obtained from creel survey interviews. The Bycatch numbers are obtained by counting fish in the interviews for purely trolling trips with a disposition of bycatch. The catch for all species included for comparison is obtained by counting all species of fish caught by purely trolling interviews and the number of interviews is a count of purely trolling interviews

Figure 1. American Samoa total annual estimated landings: Tuna and Other PPMUS



Interpretation: Estimated total landings are variable in the 1980s up to 1993. However there was an increase in the number of total landings from 1993 to the present. This year there has been a 92% increase in the total landings of tuna compared to the 371% increase from 2001. Additionally, the total landing for other pelagic species also increase about 101% for 2002. Landing rates for all species increased for longlining and substantially decreased for trolling due to the popularity of the longline fishery.

Calculation: Estimated total landings for Tunas and Other PPMUS were calculated by summing the total landings for the species in these categories as defined by Table 1.

	Pounds Landed	
Year	Tuna	Other PPMUS
1982	23,042	2,106
1983	90,057	4,806
1984	198,961	15,121
1985	107,659	19,686
1986	187,909	23,415
1987	144,121	10,899
1988	207,083	23,462
1989	173,518	20,053
1990	78,827	9,848
1991	71,425	21,100
1992	92,600	11,893
1993	45,806	19,104
1994	187,459	47,418
1995	282,897	61,931
1996	315,320	67,946
1997	791,399	122,687
1998	1,160,079	164,364
1999	1,007,322	180,940
2000	1,668,188	172,423
2001	7,863,880	292,745
2002	15,136,343	589,022
Average	**1,420,662**	**89,570**
Std. Dev.	**3,483,025**	**134,999**

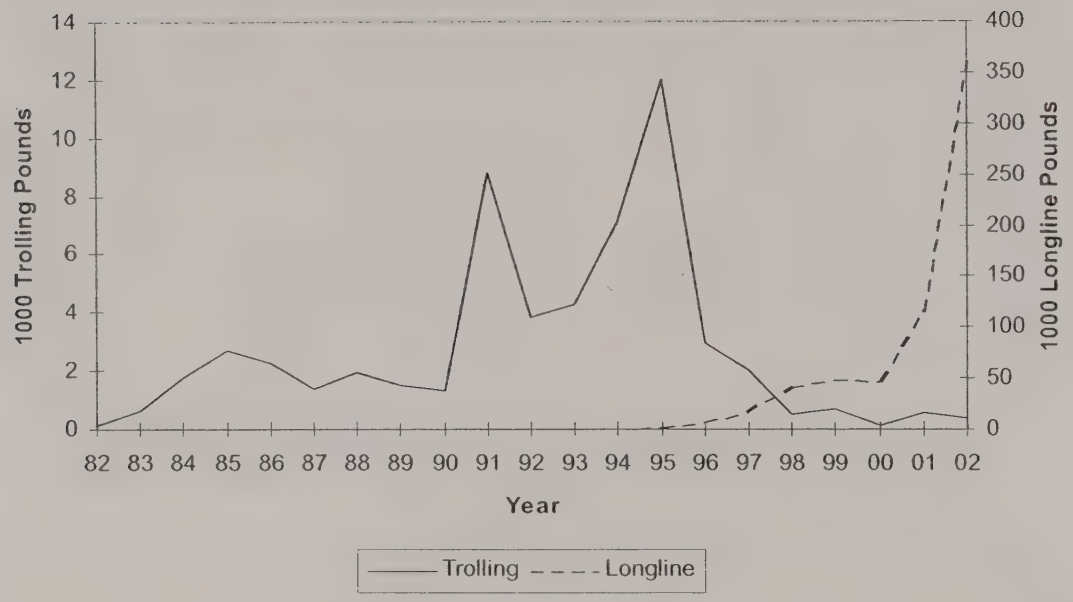
Figure 2. American Samoa annual estimated landings for Mahimahi by gear.

Interpretation: Through the years, Mahimahi landings have been variable. From 1984-1988, American Samoan fishermen exported mahimahi to Hawaii so landings were uniquely high and remained stabled until 1995. Mahimahi landings were the largest since 1995 to the present, due to the increase of effort in the longline fishery. This year, longliners caught virtually 99% of the mahimahi and trolling method took in only 1% . Additionally, there has been a slight decrease in the landings this year compared to that of 2001 and this may have been due to the bad recruitment of the different year classes. However, this decrease does not pose a problem for the fishery.

Calculation: The estimated total annual landings of mahimahi is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when mahimahi are caught by other methods..

	Pounds Landed	
Year	Longline	Trolling
1982	0	777
1983	0	1,443
1984	0	1,844
1985	0	8,011
1986	0	10,327
1987	0	3,051
1988	0	6,736
1989	0	3,201
1990	0	2,971
1991	74	1,748
1992	0	2,242
1993	215	3,809
1994	98	8,869
1995	2,301	8,052
1996	5,395	4,906
1997	33,031	3,517
1998	33,458	843
1999	35,909	2,193
2000	42,616	66
2001	87,114	786
2002	85,857	656
Average	**27,172**	**3,621**
Std. Dev.	**30,891**	**2,963**

Figure 3. American Samoa annual estimated landings for Wahoo by gear.



Interpretaion: Although there is a decline in the number of trolling activities for wahoo, the number of total landings have been on an increasing trend in longlining since 1995. Longliners took in almost the rest of the landings this year for wahoo, the remaining 0.1% is accounted for by trollers. The continuous increase in wahoo landings is primarily due to the increase in longline trips and effort.

Calculation: The estimated total annual landings of wahoo is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when wahoo are caught by other methods.

	Pounds Landed	
Year	Longline	Trolling
1982	0	114
1983	0	632
1984	0	1,777
1985	0	2,678
1986	0	2,244
1987	0	1,395
1988	84	1,962
1989	0	1,489
1990	0	1,299
1991	369	8,764
1992	0	3,848
1993	557	4,250
1994	0	7,124
1995	1,576	11,986
1996	6,931	2,945
1997	15,620	2,001
1998	40,405	487
1999	48,303	685
2000	47,355	140
2001	114,517	588
2002	357,880	358
Average	**42,240**	**2,703**
Std. Dev.	**89,790**	**3,008**

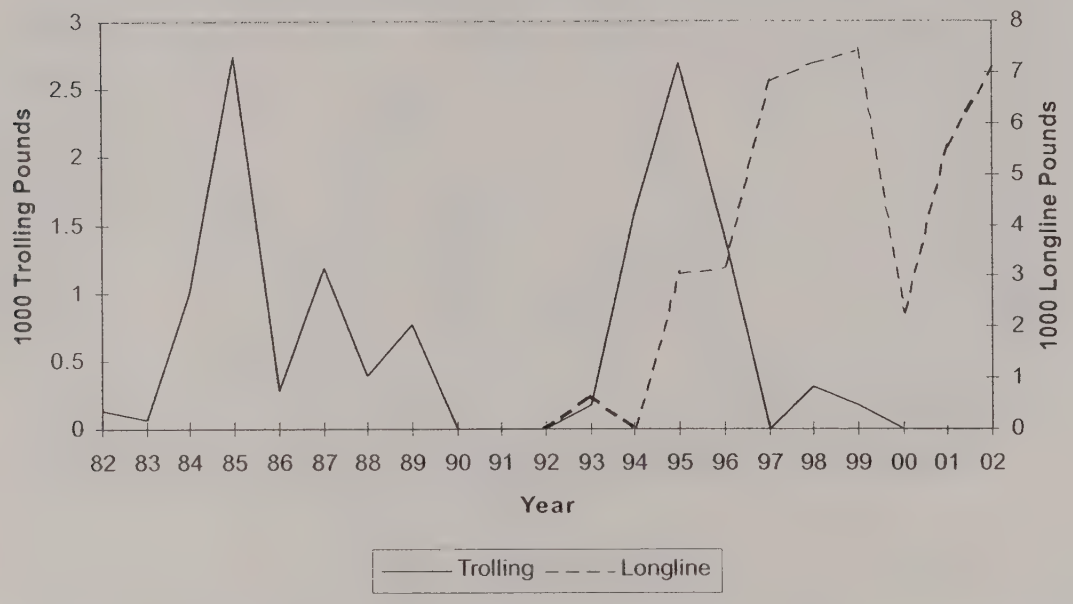
Figure 4. American Samoa annual estimated landings for Blue marlin by gear.

Interpretation: All of the blue marlin landings were caught by trolling method since 1982 until 1994, except in 1993 where blue marlin catches were recorded being caught by four vessels that were engaged in longline activities. A gradual increase in blue marlin landings by longline method since 1995 is primarily due to the influx in the longline fishery by the local fishermen, whereas catches by trolling method began to decline. Like 2001, the total landings in 2002 was by longlining. The 42% decrease in total landings in 2001 was recovered by the increase of landings this year of 126%.

Calculation: The estimated total annual landings of blue marlin is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when blue marlin are caught by other methods. The average and standard deviation for the Longline Method is calculated from 1993 onward.

	Pounds Landed	
Year	Longline	Trolling
1982	0	315
1983	0	1,083
1984	0	6,097
1985	0	2,574
1986	0	4,223
1987	0	265
1988	0	10,217
1989	0	10,012
1990	0	4,012
1991	0	6,726
1992	0	4,524
1993	2,193	6,331
1994	0	18,538
1995	5,267	20,196
1996	21,450	7,547
1997	31,869	5,160
1998	45,440	1,592
1999	34,981	590
2000	57,100	623
2001	32,836	0
2002	74,257	0
Average	**30,539**	**5,268**
Std. Dev.	**23,072**	**5,543**

Figure 5. American Samoa annual estimated landings for Sailfish by gear.

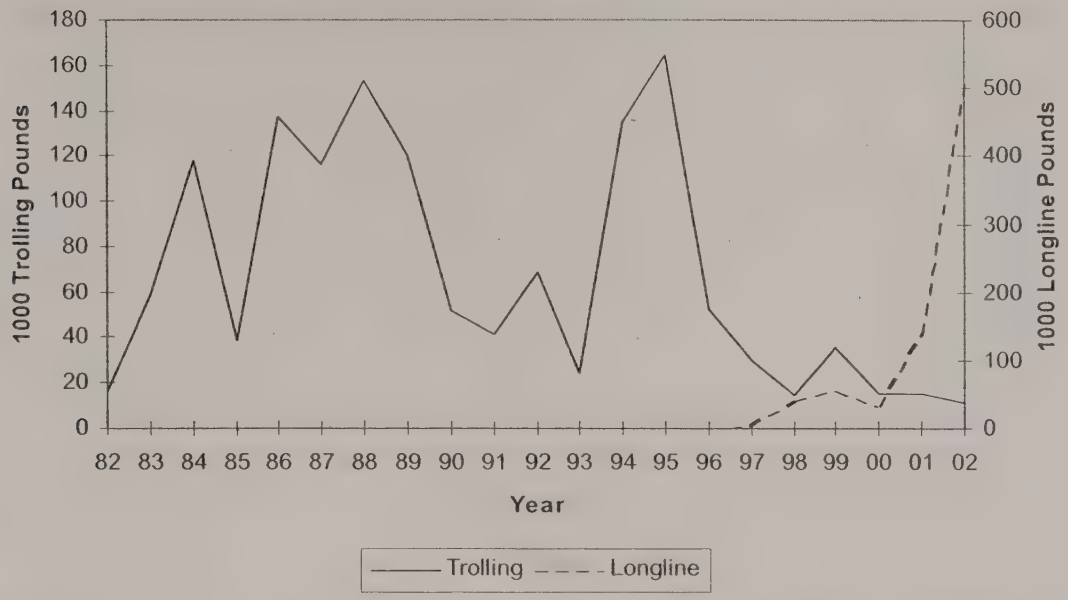


Interpretation: Sailfish landings are variable throughout the years. Initially trolling was the dominant method of fishing however longlining grew to be the popular fishing method. In 1990 to 1992, for unknown reasons, there were no sailfish recorded. Due to the continuous development of the longline fishery in 1995, there was a gradual increase in sailfish landings by longliners until 2000, where there was a 70% decrease. Sailfish landings again increased by 27% this year.

Calculation: The estimated total annual landings of sailfish is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when sailfish are caught by other methods.

	Pounds Landed	
Year	Longline	Trolling
1982	0	127
1983	0	74
1984	0	989
1985	0	2,744
1986	0	279
1987	0	1,188
1988	0	394
1989	0	767
1990	0	0
1991	0	0
1992	0	0
1993	626	183
1994	0	1,561
1995	3,048	2,693
1996	3,146	1,420
1997	6,822	0
1998	7,185	314
1999	7,424	184
2000	2,245	0
2001	5,535	0
2002	7,064	0
Average	**4,310**	**615**
Std. Dev.	**2,697**	**836**

Figure 6. American Samoa annual estimated landings for Skipjack tuna by gear.

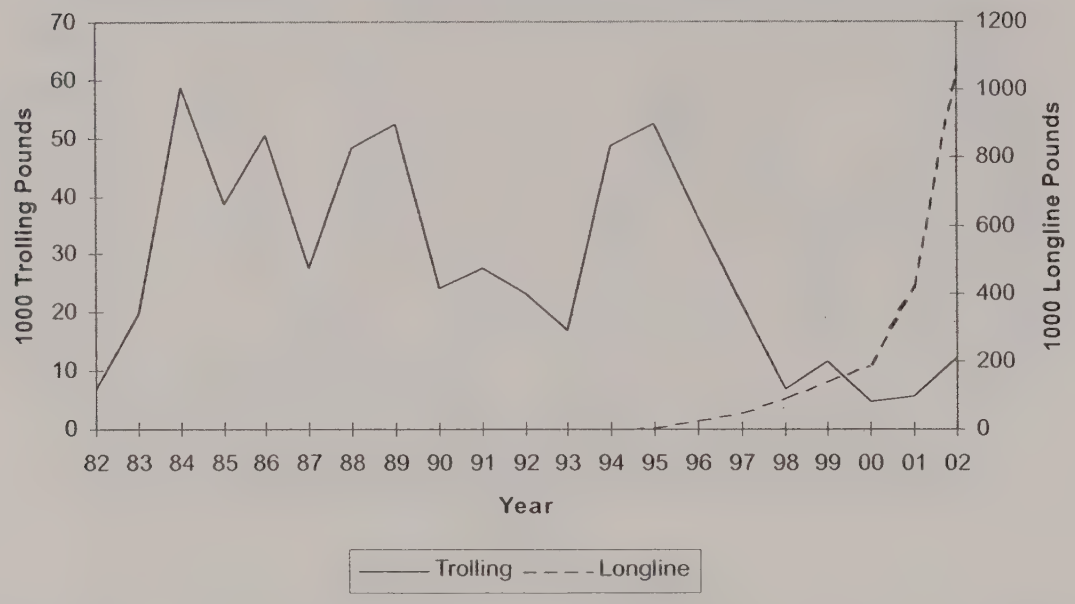


Interpretation: A gradual increase in skipjack landings for longline method since 1995, except a 43% decrease in 2000, and a notable increase of 269% this year. Trolling activities began to decline since 1995 as a result of an increase in longline participation, except in 1999 where skipjack landings increased by 137%. This reflects the increase in number of boats that were involved in trolling activities before obtaining their longline permit to begin longlining.

Calculation: The estimated total annual landings of skipjack tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when skipjack tuna are caught by other methods.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	15,877
1983	0	58,997
1984	0	117,693
1985	0	38,902
1986	0	137,180
1987	0	116,505
1988	0	153,671
1989	0	120,171
1990	0	51,650
1991	345	40,992
1992	0	68,977
1993	539	24,264
1994	101	134,955
1995	160	164,957
1996	434	52,562
1997	2,517	29,894
1998	40,596	14,822
1999	56,171	35,171
2000	31,871	15,477
2001	137,947	15,169
2002	509,232	11,033
Average	**64,993**	**67,568**
Std. Dev.	**139,488**	**50,941**

Figure 7. American Samoa annual estimated landings for Yellowfin tuna by gear.

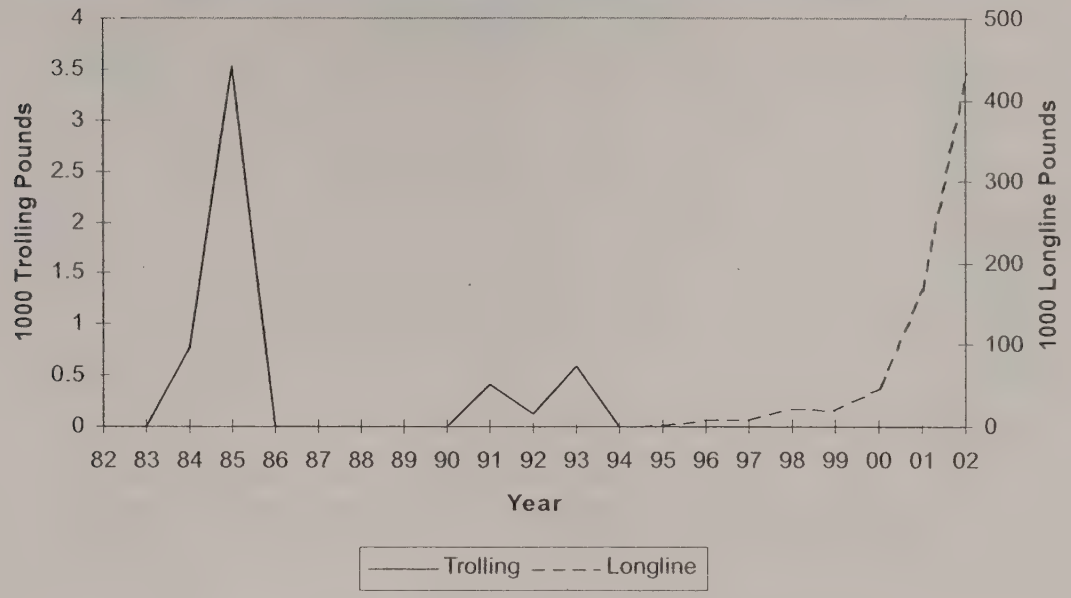


Interpretation: Trolling activities yielded all of the Yellowfin tuna landings in the 1980s until 1987 and the number of landings were variable until 1995 when trolling activities began to decline. With the increase in longline fishery in 1995, yellowfin landings began a perpetuous increase that escalated to a 158% this year.

Calculation: The estimated total annual landings of yellowfin tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when yellowfin tuna are caught by other methods.

	Pounds Landed	
Year	Longline	Trolling
1982	0	7,038
1983	0	19,789
1984	0	58,704
1985	0	38,586
1986	0	50,622
1987	0	27,467
1988	1,775	48,316
1989	129	52,350
1990	0	24,152
1991	262	27,525
1992	0	23,247
1993	2,225	16,990
1994	1,637	48,548
1995	4,022	52,428
1996	25,655	36,551
1997	47,996	21,219
1998	92,462	6,763
1999	140,061	11,566
2000	188,949	4,829
2001	413,986	5,573
2002	1,067,491	12,107
Average	**132,443**	**28,303**
Std. Dev.	**272,600**	**17,441**

Figure 8. American Samoa annual estimated landings for Bigeye Tuna by gear.

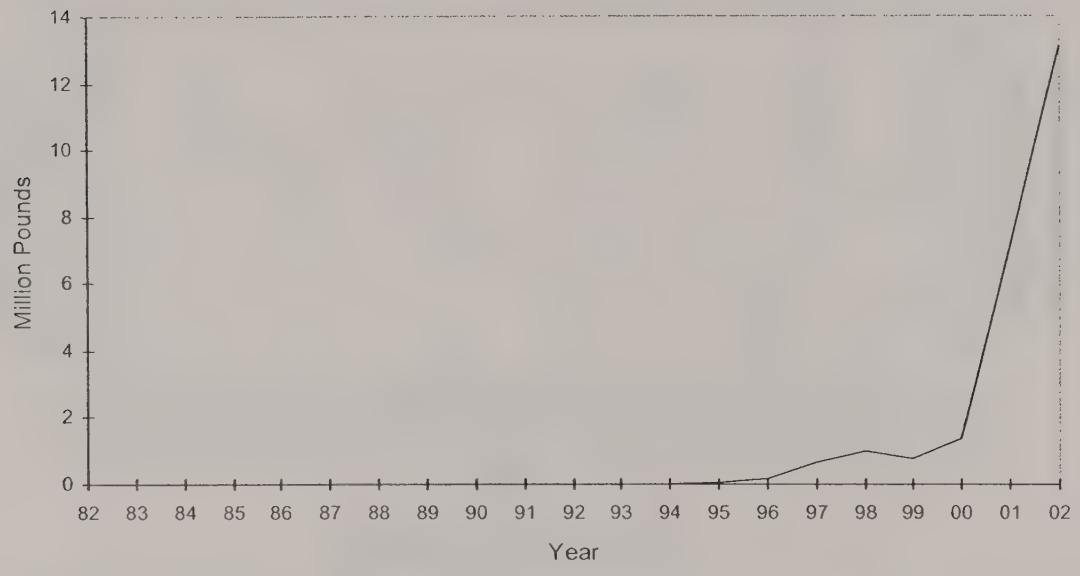


Interpretation: Before the Longline Fishery began, Bigeye tuna was commonly caught by trolling. In 1985 there was a high peak of 3,527 pounds of Bigeye, however from 1995 to the present, there has been a steady increase in the number of total landings by longline fishermen. All 100% of the total landings of Bigeye caught from 1995 to 2002 was by longlining. This year, there is a significant increase of Bigeye landings by 161%.

Calculation: The estimated total annual landings of bigeye tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when bigeye tuna are caught by other methods. The average and standard deviation for the Longline Method is calculated from 1991 onward.

	Pounds Landed	
Year	Longline	Trolling
1982	0	0
1983	0	0
1984	0	769
1985	0	3,527
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	18	417
1992	0	126
1993	79	604
1994	0	0
1995	2,191	0
1996	8,653	0
1997	8,355	0
1998	22,287	0
1999	19,254	0
2000	46,873	0
2001	165,420	0
2002	431,711	0
Average	**58,737**	**259**
Std. Dev.	**120,952**	**761**

Figure 9. American Samoa annual estimated landings for Albacore by Longlining.

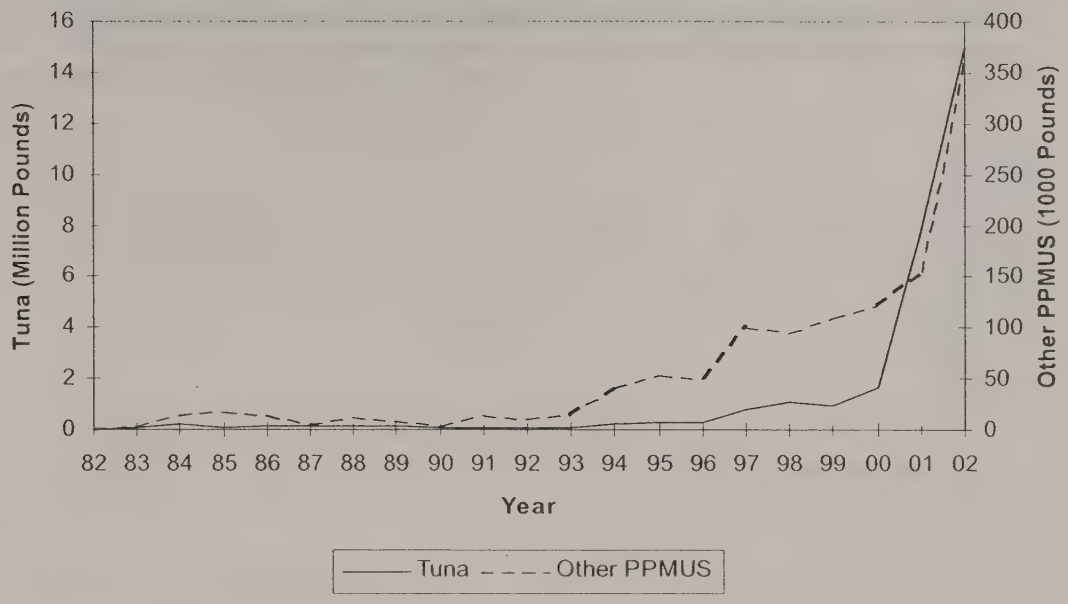


Interpretation: Since the Longline Fishery initially began, it has been the most commonly used method of fishing for pelagic species. There has been a continuous increase since 1995 in the number of estimated albacore landings with exception of the landings in 1999 where there was a 24% decrease. Compared to the estimated number of landings in 2001, there has been an 84% increase of albacore landings in 2002. In addition to being the dominant pelagic species caught in the fishery, 100% of the albacore landings in 2002 was caught by longlining and none by trolling (Figure 1).

Calculation: The estimated total annual landings of albacore tuna is listed for the longline and trolling fishing methods. The All methods landings may be greater than the sum of longline and trolling landings when albacore are caught by other methods. The average and standard deviation is calculated from 1988 onward.

Year	Pounds
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	1,875
1989	244
1990	0
1991	1,730
1992	0
1993	35
1994	1,572
1995	58,446
1996	189,210
1997	680,806
1998	983,017
1999	744,980
2000	1,380,060
2001	7,125,633
2002	13,104,279
Average	**1,618,126**
Std. Dev.	**3,532,236**

Figure 10. American Samoa annual commercial landings: Tunas and Other PPMUS.

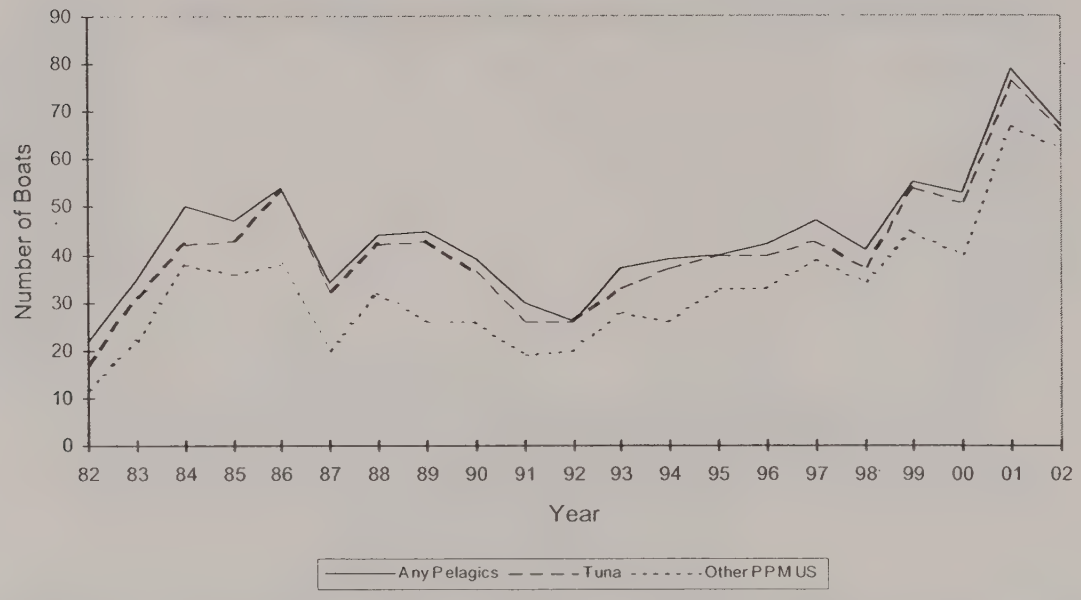


Interpretation: Commercial landings for all pelagic species and tuna significantly varied throughout the 1980s until 1995 where a steady increase in landings began to appear. This was primarily due to a surge in longline effort. However, for unknown reasons, there was a 13% decrease in 1999 for other pelagic species. This year produced a significant increase of 349% in commercial landings specifically for tuna and a 135% increase of other pelagic species.

Calculation: Estimated commercial landings for Tunas and Other PPMUS were calculated by summing the commercial landings for the species these categories as defined by Table 2.

	Pounds Landed	
Year	Tuna	Other PPMUS
1982	22,065	1,515
1983	85,069	4,441
1984	196,100	13,458
1985	99,987	17,515
1986	167,791	14,995
1987	132,316	4,843
1988	172,788	12,110
1989	114,671	8,240
1990	55,420	3,564
1991	57,474	15,236
1992	88,953	10,698
1993	43,525	14,053
1994	186,199	40,708
1995	276,332	53,127
1996	309,147	50,781
1997	789,260	100,024
1998	1,114,702	94,933
1999	949,355	109,960
2000	1,630,410	122,638
2001	7,795,827	154,409
2002	14,961,570	362,597
Average	**1,392,808**	**57,612**
Std. Dev.	**3,448,105**	**81,753**

Figure 11. Number of American Samoa boats landing any pelagic species, tunas and other PPMUS.



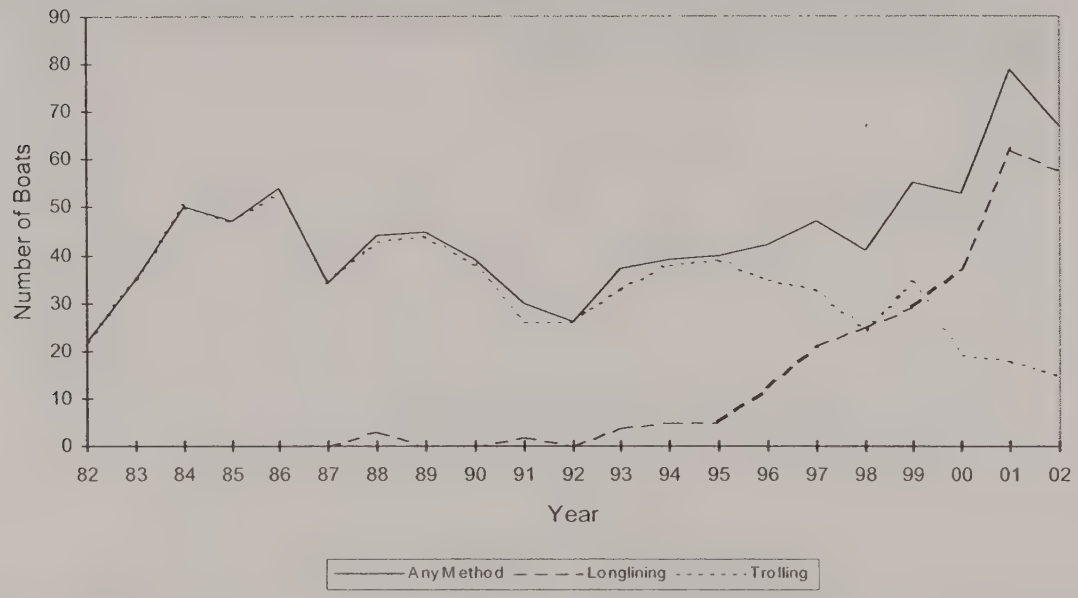
Interpretation: Since 1982, the number of boats that landed any pelagic species, tuna and other PPMUS varied. However in 2001, there was a dramatic increase in the number of boats landing catch in American Samoa. This is the highest number of boats ever recorded participating in the pelagic fishery since 1982. This year there has been a decrease in the number of boats landing fish. Possible contributing factors to this occurrence may be due to the decrease in the prices at the canneries and the replacement of multiple alias by larger vessels.

Calculation: Prior to 1997, each boat counted in the Any Pelagics column made

	Number of Boats Landing		
Year	Any Pelagics	Tuna	Other PPMUS
1982	22	17	12
1983	35	31	22
1984	50	42	38
1985	47	43	36
1986	54	53	38
1987	34	32	20
1988	44	42	32
1989	45	43	26
1990	39	36	26
1991	30	26	19
1992	26	26	20
1993	37	33	28
1994	39	37	26
1995	40	40	33
1996	42	40	33
1997	47	43	39
1998	41	37	34
1999	55	54	45
2000	53	51	40
2001	79	76	67
2002	67	66	62
Average	**44**	**41**	**33**
Std. Dev	**13**	**13**	**13**

at least one landing in an offshore creel survey interview of at least one species in Table 2 in the given year. Likewise each boat counted in the other two columns made at least one landing in an offshore creel survey interview of at least one species in the corresponding subgroup of Table 2 in the given year. In 1997 and after the count of non-interviewed boats that made at least one landing of the appropriate species in a longline log was added to the count of interviewed boats from the offshore creel survey.

Figure 12. Number of American Samoa boats landing any Pelagic Species, by Longlining, Trolling and All Methods.



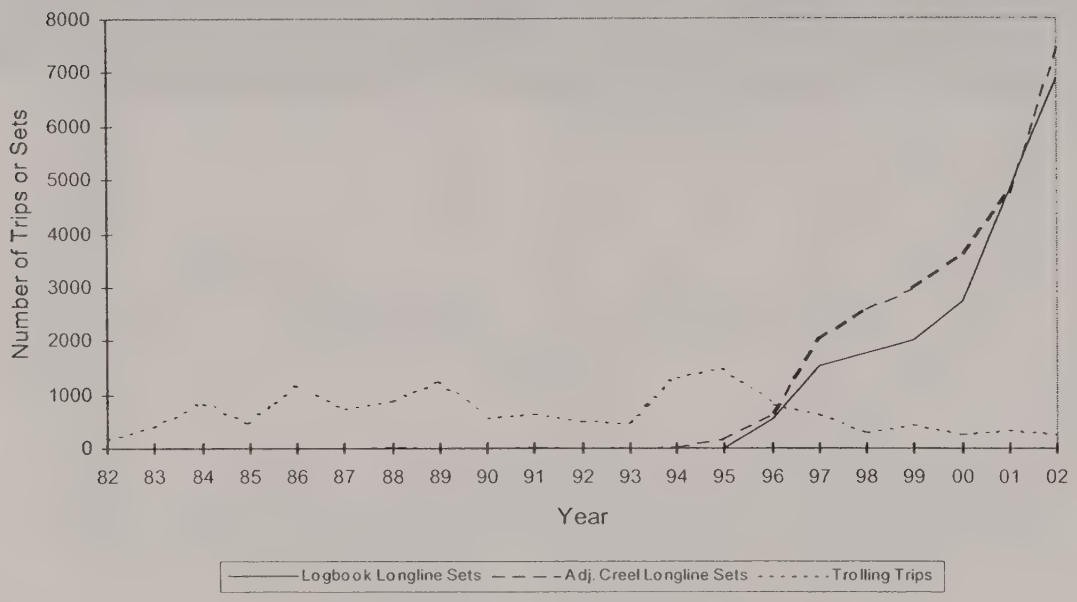
Interpretation: Since the longline fishery was introduced, there has been a continuous increase in the number of boats using this kind of fishing method. Conversely, the number of boats participating in trolling activities have decreased starting from 1995 to the present mainly due to the development of the longline fishery.

Calculation: Prior to 1997, each boat counted in the Any Method column made at least one landing in an offshore creel survey interview of at least one species in Table 2 in the given year. Each boat counted in the Longlining and Trolling columns made at least one landing in an offshore creel survey interview of at least one species in Table 2,

	Number of Boats Using		
Year	Any Method	Longlining	Trolling
1982	22	0	22
1983	35	0	35
1984	50	0	50
1985	47	0	47
1986	54	0	53
1987	34	0	34
1988	44	3	43
1989	45	0	44
1990	39	0	38
1991	30	2	26
1992	26	0	26
1993	37	4	33
1994	39	5	38
1995	40	5	39
1996	42	12	35
1997	47	21	33
1998	41	25	24
1999	55	29	34
2000	53	37	19
2001	79	62	18
2002	67	58	15
Average	**44**	**18**	**34**
Std. Dev.	**13**	**20**	**10**

using the longline or troll or combined troll/bottom fishing methods in the given year. In 1997 and after the count of non-interviewed boats that made at least one landing of the species in Table 2 in a longline log during the given year was added to the count of interviewed boats from the offshore creel survey in the Any Method and Longlining columns. The average and standard deviation for the number of boats using Longlining is calculated from 1988 onward.

Figure 13. American Samoa fishing trips or sets for all pelagic species by method.



Interpretation: Trolling trips varied from 1982 to 1995 when it began a continuous decline. In 1999, there was a number of boats awaiting approval of their longline permits thus continued trolling. In the year 2000 there was a further decrease of trolling trips by 34% however there was 18% increase mainly due to boats switching between trolling and longlining. A steady increase of fishing trips since 1995 both for number of sets made by creel survey and longline logbooks submitted reflects the increase in longline activities since it began.

Calculation The number of Troll Trips is calculated by first subtracting the total longline pounds of Table 1 from the total pounds to get an estimate of the number of pounds caught by trolling and other fishing methods. This value is divided

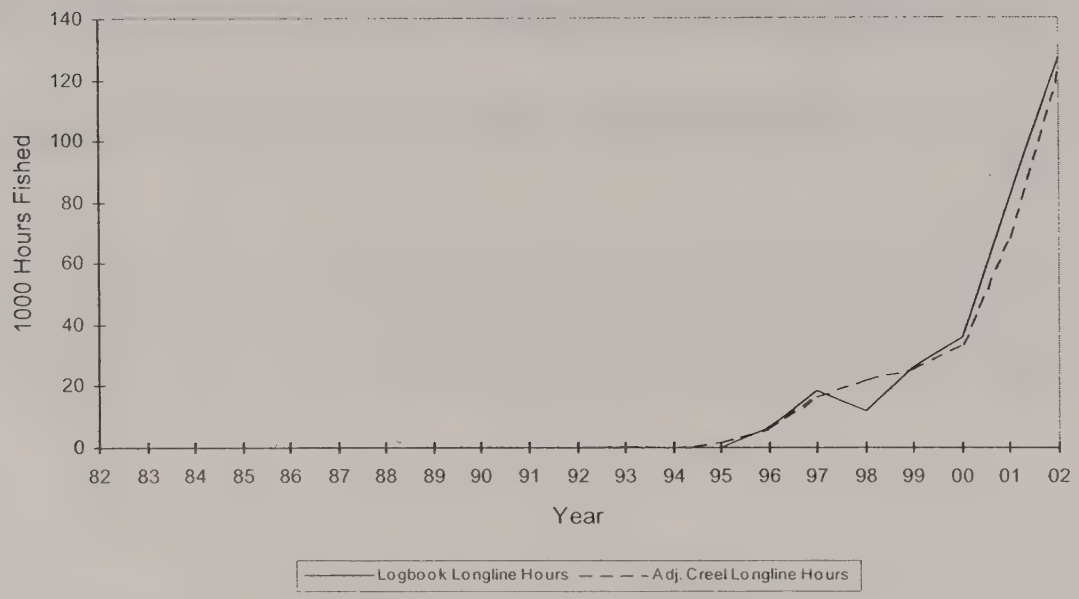
		Longline Sets	
Year	Troll Trips	Logbook	Creel (Adj)
1982	177	0	0
1983	406	0	0
1984	853	0	0
1985	464	0	0
1986	1,208	0	0
1987	752	0	0
1988	875	0	31
1989	1,273	0	3
1990	587	0	0
1991	634	0	21
1992	506	0	0
1993	464	0	17
1994	1,330	0	19
1995	1,504	0	184
1996	834	528	650
1997	645	1,528	2,009
1998	316	1,754	2,582
1999	428	2,011	2,978
2000	283	2,708	3,598
2001	331	4,800	4,722
2002	286	6,861	7,419
Average	**674**	**2,884**	**3,423**
Std. Dev.	**373**	**2,034**	**2,010**

by the catch per hour for pure troll trips, from the offshore creel survey system expansion, to get the number of trolling hours. The number of trolling hours is then divided by the hours per trip for a purely trolling trip from the offshore creel survey system expansion to get the number of troll trips.

The number of longline sets using logbook data is obtained by counting all of the sets entered in the longline logbook system for the given year for interviewed and non_interviewed boats.

Prior to 1997, the number of longline sets using creel survey data is the expanded number of longline fishing trips from the offshore creel survey system. In 1997 and after this number is the expanded number of longline fishing trips from the offshore creel survey system for interviewed vessels plus the count of all of the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for Longline Sets from logbook data and creel data is calculated from 1996 onward for comparison.

Figure 14. American Samoa Hours Fished for all pelagic species by Longlining.



Interpretation: The combination of longline hours from Longline Logbooks and the Longline Creel Survey significantly shows an increase in hours fished every year since the Longline Fishery was initially introduced. This year, according to the Logbook monitoring system, there was a 56% increase whereas the longline creel survey indicates a 82% increase in the number of hours spent fishing. This indicates that there is an increase in the amount of effort put into the fishery.

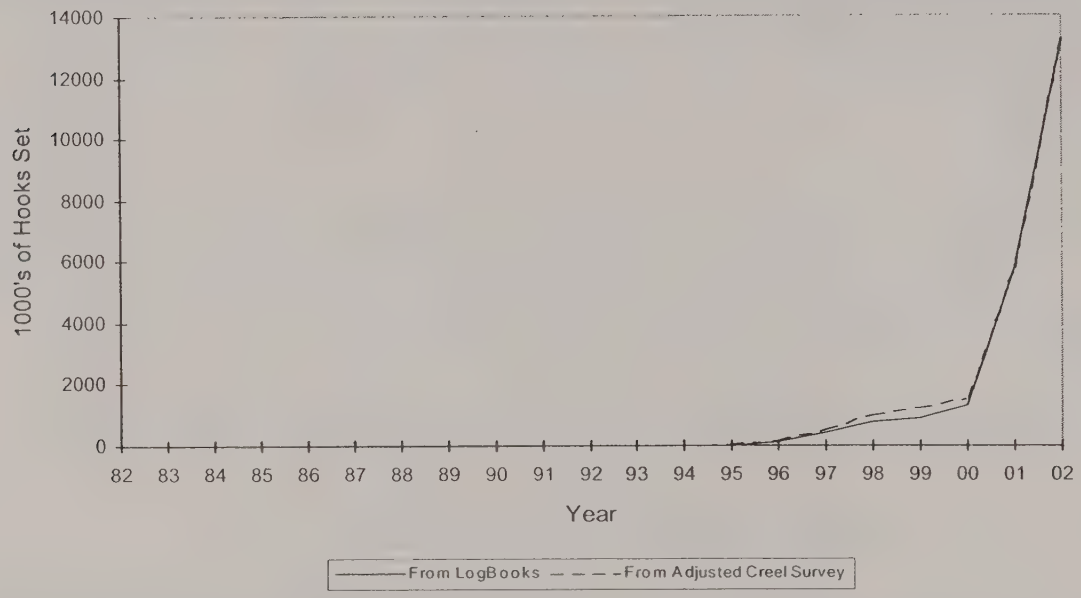
Calculation: The number of longline trip-hours using logbook data is obtained by summing the duration all of the sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats. The duration of a set is defined as from end of set time to the beginning of haul time.

Prior to 1997, the number of longline trip-hours using creel survey data is the expanded number of longline fishing trip-hours from the offshore creel survey system. In 1997 and after this number is the expanded number of longline fishing trip-hours from the offshore creel survey system for interviewed vessels plus the sum of the

	Hours Fished	
Year	Longline Logbook	Longline Creel (Adj.)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	198
1989	0	17
1990	0	0
1991	0	164
1992	0	0
1993	0	299
1994	0	156
1995	0	1,824
1996	6,403	5,877
1997	18,753	16,754
1998	11,981	21,953
1999	26,376	25,865
2000	35,458	33,288
2001	81,264	67,707
2002	126,815	122,902
Average	**43,864**	**42,049**
Std. Dev.	**40,895**	**37,581**

duration of the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for Hours Fished from logbook data and creel data is calculated from 1996 onward for comparison.

Figure 15. American Samoa number of longline hooks (x1000) set from logbook and creel survey data.



Interpretation: Since the Longline Fishery began in 1995, the number hooks set has been increasing at a steady rate which clearly indicates an explosion of the fishery since 2000. However, in 2001 and 2002 the number of hooks multiplied. According to the Logbook data, the number of hooks used in 2002 dramatically increased by 126% and by 128% as it is revealed by the offshore creel survey. The steady increase in the number of hooks set by the longline fishery has been evident since 1996.

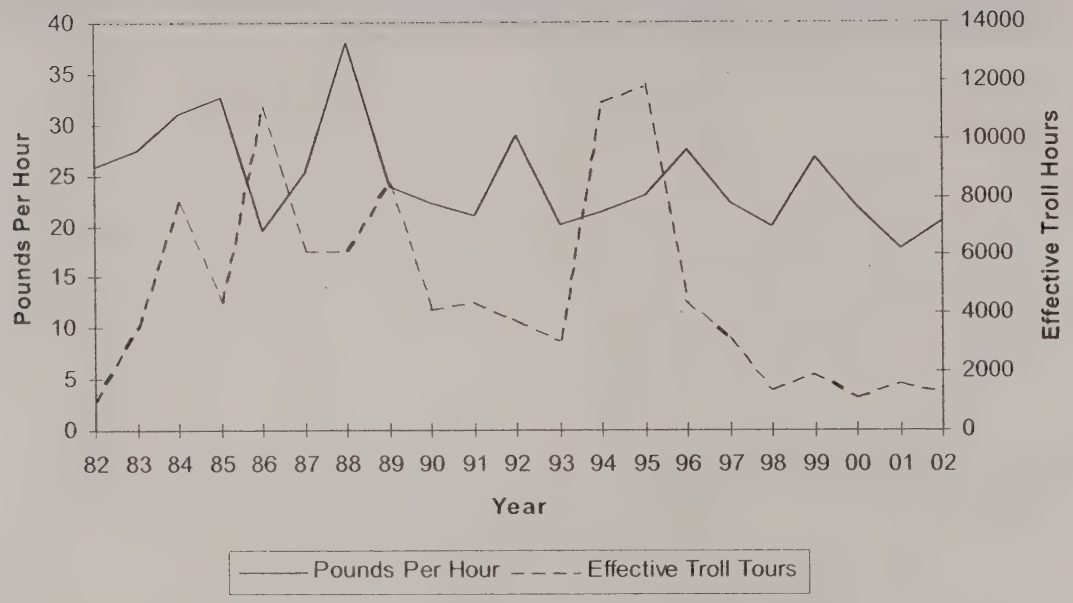
Calculation: The number of longline hooks using logbook data is obtained by summing the number of hooks for sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats and dividing by 1000.

Prior to 1997, the number of longline hooks using creel survey data is the expanded number of longline hooks from the offshore creel survey system. In 1997 and after this number is the expanded number of longline fishing hooks from the offshore creel survey system for interviewed vessels plus

Year	1000's of Hooks From Logbook Data	1000's of Hooks From Creel (Adjusted)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	1
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	2
1994	0	0
1995	0	45
1996	99	157
1997	420	512
1998	771	1,042
1999	885	1,229
2000	1,296	1,567
2001	5,794	5,806
2002	13,077	13,219
Average	**3,192**	**3,362**
Std. Dev.	**4,416**	**4,386**

the sum of the number of hooks for the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for 1000's of Hooks from logbook data and creel data is calculated from 1996 onward for comparison.

Figure 16. American Samoa overall pelagic catch per hour of trolling.



Interpretation: The overall catch per hour for pelagic species for trolling is primarily the combined skipjack and yellowfin CPUE shown in Figure 18. These two species constituted 92% of the total pelagic troll catch this year.

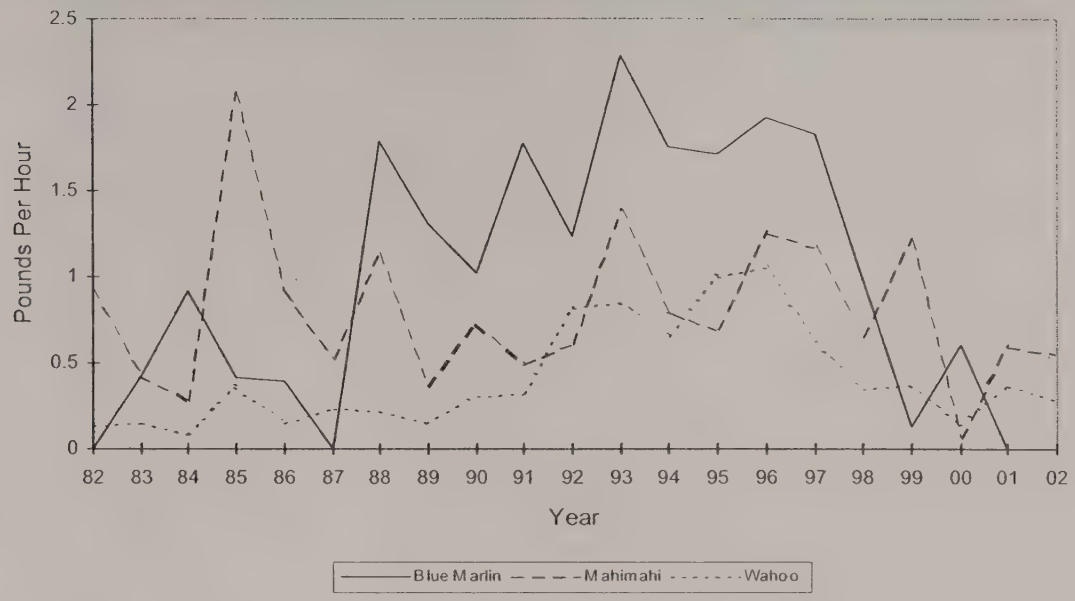
The decline in trolling hours in 1996 was mainly due to the the popularity of the longline fishery since it was introduced. However, 1999 was an exceptional year because of the number of new boats that entered the pelagic fishery and were involved in trolling before obtaining their longline permits. Trolling effort decreased in 2000 and 2001 with a 15% increase this year. This increase is probable due to the amount of boats that actually participated in the fishery this year compared to the past. This year 1,345 hours of trolling produced 20.39 CPUE. The variability throughout the years may have been a result of some fishing interaction.

Calculation: For purely trolling trips where the number of hours was recorded, the total catch was divided by the total number of trolling hours to obtain CPUE.

The number of effective Trolling Trip_Hours is calculated by first subtracting the total longline pounds of Table 1 from the total pounds to get an estimate of the number of pounds caught by trolling and other fishing methods. This value is divided by the catch per hour for pure troll trips, from the offshore creel survey system expansion, to get the number of trolling trip-hours.

Year	CPUE	Hours
1982	25.91	1,019
1983	27.41	3,513
1984	30.97	7,785
1985	32.59	4,394
1986	19.49	11,030
1987	25.34	6,182
1988	38.01	6,126
1989	23.87	8,397
1990	22.16	4,136
1991	20.93	4,407
1992	28.90	3,748
1993	20.17	3,065
1994	21.37	11,211
1995	23.01	11,781
1996	27.36	4,365
1997	22.29	3,089
1998	19.93	1,405
1999	26.81	1,977
2000	21.94	1,116
2001	17.72	1,661
2002	20.39	1,345
Average	**24.60**	**4,845**
Std. Dev.	**4.90**	**3,330**

Figure 17. American Samoa trolling catch rates: Blue Marlin, Mahimahi, and Wahoo.



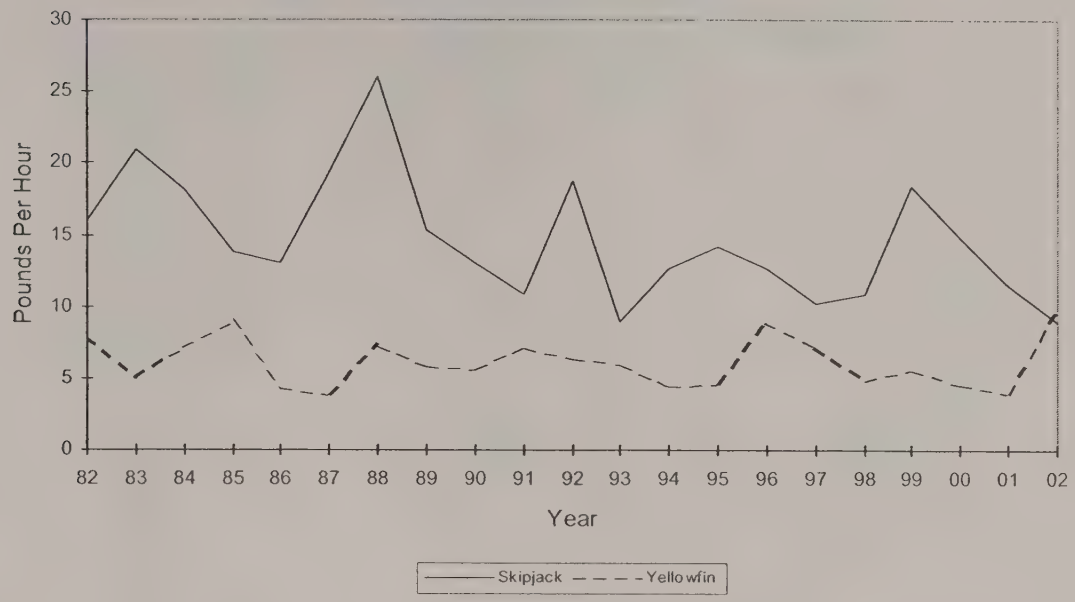
Interpretation: Blue marlin CPUE is variable but generally increased over time until about 1997 when it began to decline. It is not known if this decrease has any relationship to the huge growth in the longline fishery during this time span. Mahimahi CPUE peaked in the mid-eighties, when an exported market existed for this species. Since that time, mahimahi CPUE has been variable and dropped to a record low in 2000. Wahoo CPUE seemed fairly stable in the 1980s until 1995 probably due to the influx in the longline fishery.

Since 1996 wahoo catch rates have dropped similar to blue marlin, but this may not be related to the increase in longline activity. On the other hand, this could an indication of "localized over-fishing" and interactions.

	Pounds Caught Per Trolling Hour		
Year	Blue Marlin	Mahimahi	Wahoo
1982	0.00	0.92	0.14
1983	0.43	0.43	0.15
1984	0.91	0.28	0.09
1985	0.41	2.06	0.36
1986	0.39	0.90	0.15
1987	0.00	0.52	0.23
1988	1.79	1.13	0.22
1989	1.31	0.36	0.15
1990	1.02	0.72	0.31
1991	1.78	0.49	0.32
1992	1.23	0.61	0.82
1993	2.29	1.38	0.85
1994	1.76	0.80	0.65
1995	1.71	0.69	1.00
1996	1.93	1.26	1.05
1997	1.83	1.17	0.62
1998	0.99	0.65	0.35
1999	0.13	1.21	0.37
2000	0.61	0.06	0.14
2001	0.00	0.60	0.37
2002	0.00	0.55	0.29
Average	**0.98**	**0.80**	**0.41**
Std. Dev.	**0.74**	**0.44**	**0.29**

Calculation: The values for each of the three species is obtained by dividing the Troll Pounds for each species in Table 1 by the expanded number of trip-hours for purely trolling trips from the offshore creel survey system.

Figure 18. American Samoa trolling catch rates: Skipjack and Yellowfin tuna

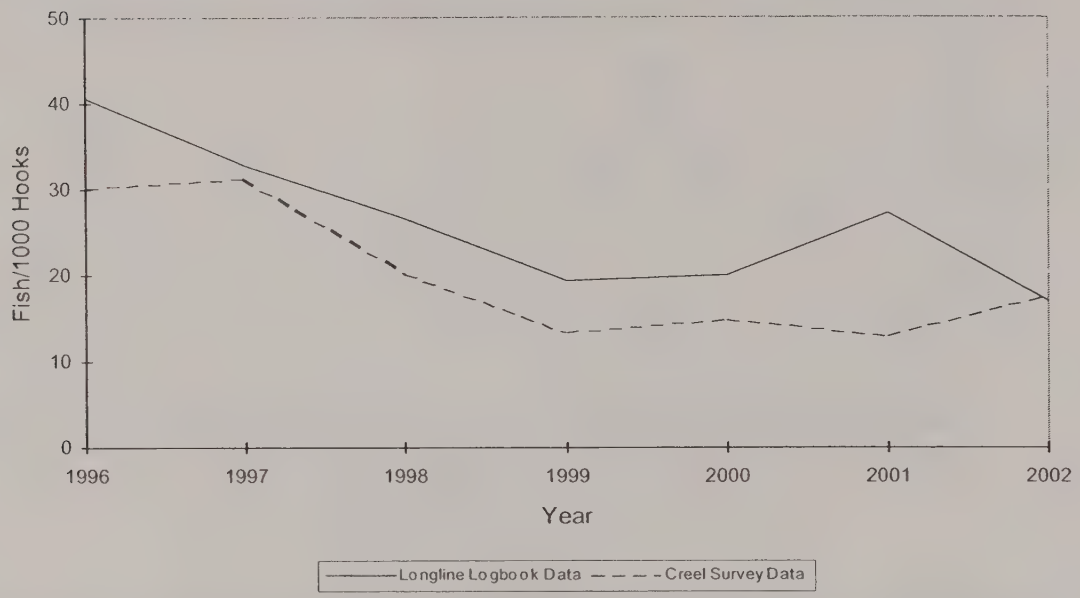


Interpretation: The values for Skipjack and Yellowfin CPUE has been variable through the years with a declining trend since 1996 except in 1999. During 1999, a couple of boats did some extensive trolling before obtaining their longline permits to longline. This however was a contributing factor to the increase in the number of trolling activity at this time. CPUE for Skipjack continued to decrease this year from 2001 whereas the CPUE for Yellowfin experienced a 145% increase this year.

Calculation: The values for each of the two species is obtained by dividing the Troll Pounds for each species in Table 1 by the expanded number of trip-hours for purely trolling trips from the offshore creel survey system.

	Pounds Caught Per Trolling Hour	
Year	**Skipjack**	**Yellowfin**
1982	15.90	7.80
1983	21.00	5.04
1984	18.10	7.20
1985	13.80	8.90
1986	13.00	4.35
1987	19.30	3.88
1988	26.00	7.30
1989	15.30	5.91
1990	13.00	5.59
1991	10.80	7.16
1992	18.80	6.34
1993	8.94	6.03
1994	12.70	4.50
1995	14.20	4.56
1996	12.70	8.99
1997	10.20	7.21
1998	10.80	4.89
1999	18.40	5.62
2000	14.80	4.64
2001	11.50	4.01
2002	8.92	9.82
Average	**14.67**	**6.18**
Std. Dev.	**4.22**	**1.70**

Figure 19. American Samoa catch rates of Albacore for the Alia longline fishery Comparing Logbook and Creel Survey Data



Interpretation: The longline fishery in American is a newly developed fishery that emerged in 1995. Both monitoring systems (Longline Logbook and Creel Survey) indicate similar fluctuations of the catch rates of albacore through this fishery since it first started. Alias are the most commonly used boats by the local fishermen in the fishery and albacore the primary target species. The value of albacore catch rate through the years since 1996 have been declining except in 2001. During this time, the value of albacore catch rate increased by 68% representative of a high peak of the catch rate specifically by alias. In 2002, the Longline Logbook indicates a 60% decrease whereas the Offshore Creel Survey shows a slight increase of 36%. This decline may have been due to a stock problem or a background trend on a large scale however with the fishery expansion, there is enough influx of fish to support the alia fleet. In addition, the decline may not show a problem of recruitment but the expression of the intense fishing pressure on the fishery. If this trend continues, the fishery may well face a dramatic situation within the next few years.

Calculation: These values compare the CPUE's of only the alias. For the longline logbook data, the total number of kept fish of each species is divided by the sum of the hooks in the sets of alias or surveyed vessels over the given year used to catch them. For the creel survey data the expanded total landings for each species given in Table 1 is divided by the pounds/fish value obtained by averaging creel survey data over the year to find the number of pieces of each species. The number of pieces for each species caught during the year is divided by the expanded number of hooks for the given year.

Table 6A. American Samoa catch rates by Species for the Alia longline fishery Comparing Logbook and Creel Survey Data for 1996-1998

	Number of Fish Per 1000 Hooks					
	1996		1997		1998	
Species	Log	Creel	Log	Creel	Log	Creel
Skipjack Tuna	0.06	0.29	1.15	0.60	3.71	4.01
Albacore	40.60	30.26	32.79	31.20	26.61	20.23
Yellowfin Tuna	6.50	4.32	2.73	2.48	2.18	2.27
BigeyeTuna	1.33	1.06	0.30	0.14	0.27	0.11
Tunas					0.01	
Mahimahi	2.29	1.31	2.24	2.84	1.70	1.83
Black marlin			0.09	0.02		
Blue marlin	0.93	0.90	0.65	0.61	0.55	0.49
Striped Marlin			0.02		0.03	
Wahoo	0.83	0.52	0.90	0.85	2.20	2.03
Other Sharks	0.28	0.37	0.11	0.17	0.12	0.08
Swordfish	0.03	0.01	0.06	0.01	0.03	0.02
Sailfish	0.18	0.23	0.17	0.21	0.05	0.14
Spearfish					0.03	
Moonfish			0.10	0.15	0.07	0.07
Oilfish					0.01	0.04
Pomfret					0.00	
Barracudas		0.57		0.87		0.42
Rainbow runner				0.01		0.01
Dogtooth tuna						0.00
Other Pelagic Fish					0.22	0.01

Table 6B. American Samoa catch rates by Species for the Alia longline fishery Comparing Logbook and Creel Survey Data for 1999-2002

	Number of Fish Per 1000 Hooks							
	1999		2000		2000		2002	
Species	Log	Creel	Log	Creel	Log	Creel	Log	Creel
Skipjack Tuna	4.88	4.77	1.97	1.95	3.01	3.35	5.87	5.44
Albacore	19.29	13.44	19.94	14.81	27.23	12.94	17.07	17.56
Yellowfin Tuna	6.77	4.49	6.48	3.25	3.27	4.19	7.04	10.65
BigeyeTuna	0.72	0.20	0.42	0.22	0.61	0.35	0.58	0.48
Tunas								
Mahimahi	2.28	1.76	1.70	1.76	3.35	4.46	3.99	2.97
Black marlin	0.18	0.03	0.11		0.07	0.03		0.07
Blue marlin	0.51	0.38	0.47	0.47	0.38	0.26	0.22	0.35
Striped Marlin	0.02		0.06		0.03		0.05	
Wahoo	2.05	1.57	1.14	0.90	1.43	1.44	2.64	2.37
Other Sharks	0.06	0.03	0.01	0.04	0.01	0.02	0.01	0.02
Swordfish	0.03	0.01	0.02		0.10	0.02	0.11	0.02
Sailfish	0.00	0.13	0.03	0.06	0.04	0.13	0.05	0.17
Spearfish	0.00	0.01	0.01		0.00		0.02	
Moonfish	0.07	0.13	0.07	0.20	0.10	0.07	0.08	0.05
Oilfish	0.01	0.01	0.01		0.03	0.10	0.02	
Pomfret	0.01		0.02	0.04	0.02		0.02	0.11
Barracudas		0.19		0.30	0.02	0.14	0.00	0.26
Rainbow runner		0.02	0.01					0.03
Dogtooth tuna						0.02		0.02
Other Pelagic Fish	0.27				0.03		0.00	

Table 7A. American Samoa Longline Catch/1000 Hooks for the Three Types of Longline Vessels for 2000-2001

	2000		2001		
Species	Alias	Monohull	Alias	Monohull < 50'	Monohull > 50 '
Skipjack Tuna	1.97	1.70	3.11	1.74	2.21
Albacore	19.98	28.08	27.26	28.34	33.83
Yellowfin Tuna	6.49	3.07	3.31	1.39	1.41
BigeyeTuna	0.42	0.97	0.63	0.47	1.04
TUNAS SUBTOTALS	28.87	33.82	34.31	31.94	38.49
Mahimahi	1.71	0.36	3.36	0.60	0.50
Black marlin	0.11	0.10	0.07	0.00	0.02
Blue marlin	0.48	0.23	0.39	0.42	0.21
Striped Marlin	0.06	0.32	0.03	0.02	0.08
Wahoo	1.15	1.06	1.45	0.42	0.67
Other Sharks	0.01	0.70	0.04	1.18	0.63
Swordfish	0.02	0.01	0.10	0.04	0.03
Sailfish	0.03	0.04	0.05	0.02	0.03
Spearfish	0.01	0.09	0.00	0.02	0.04
Moonfish	0.07	0.15	0.10	0.10	0.08
Oilfish	0.01	0.12	0.03	0.14	0.22
Pomfret	0.02	0.12	0.02	0.07	0.09
OTHER PPMUS SUBTOTALS	3.67	3.31	5.64	3.03	2.60
Barracudas	0.00	0.00	0.02	0.01	0.03
Rainbow runner	0.01	0.00	0.00	0.00	0.00
Other Pelagic Fish	0.00	0.00	0.03	0.00	0.05
MISC SUBTOTALS	0.01	0.00	0.05	0.01	0.07
TOTAL PELAGICS	**32.54**	**37.13**	**40.00**	**34.98**	**41.17**

Table 7B. American Samoa Longline Catch/1000 Hooks for the Three Types of Longline Vessels for 2002

	2002		
Species	Alias	Monohull < 50'	Monohull > 50 '
Skipjack Tuna	5.87	2.13	5.11
Albacore	17.07	23.18	25.99
Yellowfin Tuna	7.04	0.99	1.32
BigeyeTuna	0.58	0.44	0.95
TUNAS SUBTOTALS	30.56	26.74	33.37
Mahimahi	3.99	0.91	0.56
Blue marlin	0.22	0.21	0.29
Striped Marlin	0.05	0.00	0.03
Wahoo	2.64	1.04	1.01
Other Sharks	0.02	1.31	0.79
Swordfish	0.11	0.05	0.04
Sailfish	0.05	0.01	0.03
Spearfish	0.02	0.02	0.02
Moonfish	0.08	0.07	0.07
Oilfish	0.02	0.26	0.52
Pomfret	0.02	0.03	0.09
OTHER PPMUS SUBTOTALS	7.23	3.90	3.45
Barracudas	0.00	0.00	0.09
Other Pelagic Fish	0.00	0.05	0.27
MISC SUBTOTALS	0.01	0.06	0.36
TOTAL PELAGICS	**37.80**	**30.70**	**37.18**

Interpretation: Since the development of the longline fishery in 1995, a growing number of boats with a range of different sizes entered the fishery. These boats include alias, averaging around 28 to 30 feet, monohull less than 50 feet, and monohull greater than 50 feet in length. Table 7 has been included in this report to better represent the catch per 1000 hooks for each type of longline vessel. Additionally, total catch rates for pelagic species dropped this year compared to rates in 2001.

Calculation: These values are sums of the Longline Logbook catch (number of fish kept+released+finned) for the three types of longline vessels in Samoa divided by the total number of hooks set by each type of vessel. In 2000 there was only one monohull < 50' so its catch was combined with the rest of the monohulls. All species of sharks entered in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

Table 8. American Samoa Estimated average Pounds per Fish by species from the Offshore Creel Survey Interviews and from Cannery Sampling

	Creel Survey Annual Average Lbs. per Fish						
Species	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Skipjack Tuna	9.6	8.4	12.5	9.7	11.6	14.8	11.1
Albacore	39.9	44.0	45.7	42.6	45.1	44.8	45.5
Yellowfin Tuna	37.9	44.2	45.9	33.1	38.1	31.3	28.0
BigeyeTuna	52.3	82.8	79.2	57.1	61.1	69.2	67.6
Tunas							
Mahimahi	26.2	25.6	23.3	22.3	24.8	19.7	19.3
Black marlin		148.3		101.9		67.2	31.9
Blue marlin	151.8	117.7	119.9	101.9	135.7	70.9	190.4
Striped Marlin							
Wahoo	44.3	38.4	26.3	27.3	31.9	29.7	28.2
Other Sharks	112.3	96.8	69.3	38.0	39.5	68.8	68.5
Swordfish	150.0	100.0	212.6	12.0		59.4	23.4
Sailfish	88.4	70.7	67.0	61.8	39.1	42.0	33.8
Spearfish				46.0			
Moonfish		70.3	33.5	57.7	30.9	102.5	78.3
Oilfish			12.7	10.0		23.9	0.0
Pomfret					16.5		
Barracudas	13.5	14.6	15.3	11.0	13.1	7.6	9.2
Rainbow runner		14.0	17.5	6.5			
Dogtooth tuna			10.0			15.6	40.8
Other Pelagic Fish			45.3				

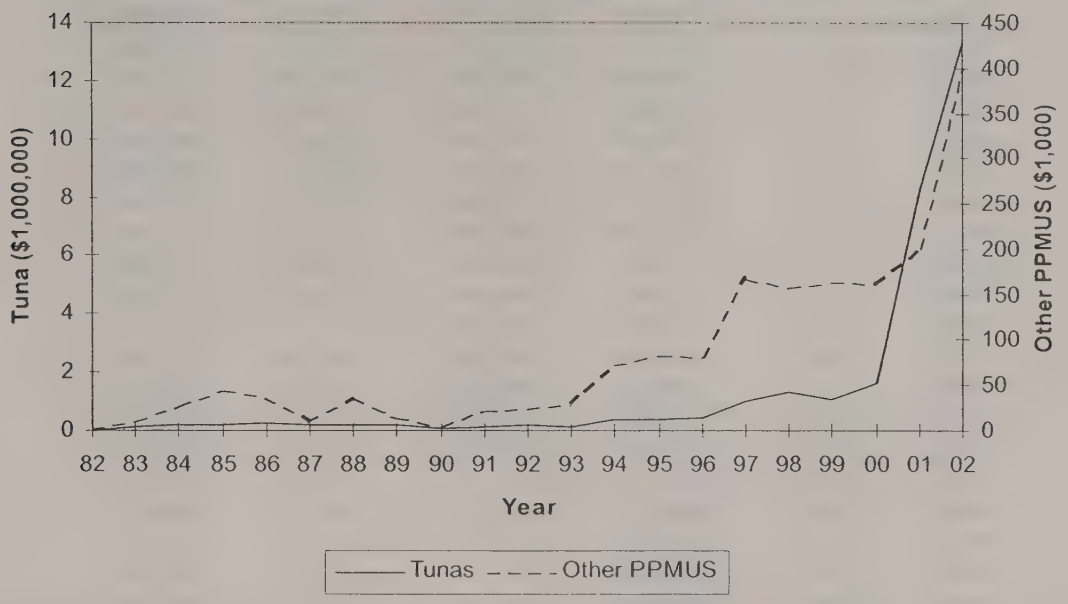
	Cannery Sampled Average Lbs. per Fish				
Species	**1998**	**1999**	**2000**	**2001**	**2002**
Skipjack Tuna				15.7	10.7
Albacore	41.0	47.2	40.7	39.8	39.1
Yellowfin Tuna				57.0	62.4
BigeyeTuna				40.7	46.8
Mahimahi				16.2	13.5
Black marlin				36.3	
Wahoo				30.6	30.7
Sailfish					34.0
Moonfish				147.6	117.6
Pomfret				2.2	2.2
Rainbow runner					9.4

Interpretation : A new table for cannery data has been added to table 8 to represent the portion of the catch unloaded by larger vessels fishing further away from Tutuila. Not a big change in average size for most of the pelagic species since 1996 according to the creel survey. Average pounds per fish from the cannery data for albacore remained relatively the same. In 1999 longline boats began landing their catche gilled and gutted to obtain higher prices at the canneries. It is possible that this new method could have an impact on size variation for the longline fishery.

Calculation: The Creel Survey Annual Average Pounds/Fish for each species was calculated from the creel survey interviews by dividing the total pounds of each species sampled during the year by the number of fish of sampled during the year. If the fish were sampled as other than whole (ie Gilled and Gutted) the sampled weight is divided by the appropriate factor (less than 1) to get the whole weight. All weights were measured directly before 2000, but after that most weights were calculated from length measurements. Since these fish are caught by alias operating close to Tutuila this represents fish sizes close to shore.

The Cannery Sampled Annual Average Pounds/Fish for each species was calculated from the length measurements made at the canneries when the fish are unloaded there. The weight of each sampled fish is calculated from the length measurements. These weights are summed over the year for each species and are then divided by the number of fish of that species sampled during the year. Since these fish are caught by larger boats operating away from Tutuila this represents fish sizes further out to sea from Tutuila

Figure 20. American Samoa annual inflation-adjusted revenue in 2002 dollars for commercially total landed pelagic species.



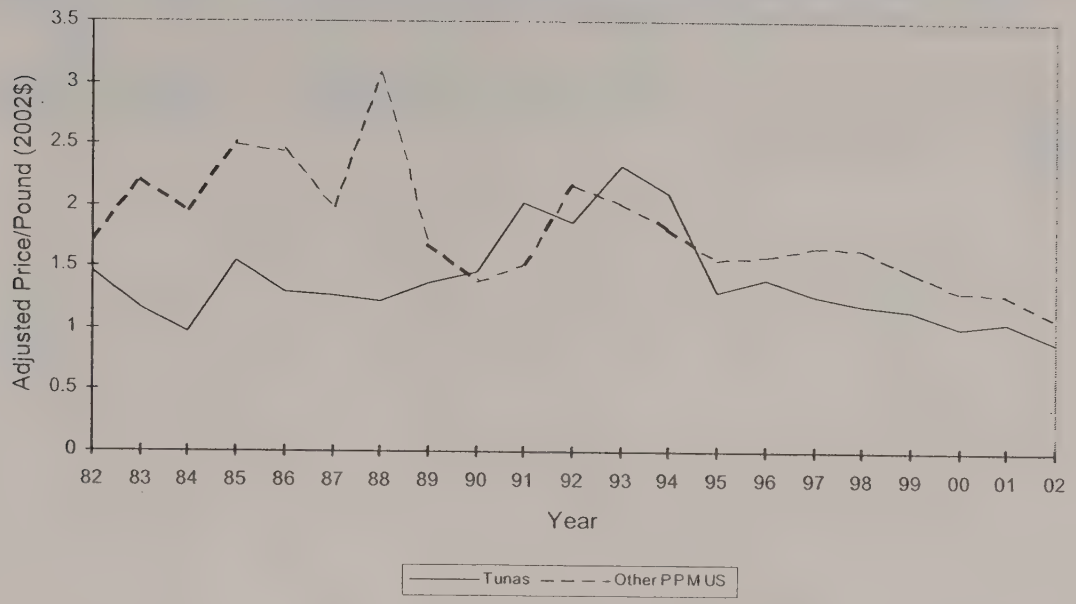
Interpretation: There has been an increase in revenues for commercial landings for all pelagic species since 1995, a period of influx in longline fishery, with a significant increase of 305% in 2001. In 2002, there has been a further in the number of revenues for all landed pelagic species. The estimated revenue generated from these total landings in 2002 is $13,737,300.00. From the early 1980's to 1995, the primary gear type for the fishery was trolling, however from 1995 to the present the dominant form of fishing was longlining.

Calculation: The unadjusted revenues for Tunas and Other PPMUS were calculated by summing the values for the species in these categories as defined by Table 2. The unadjusted revenue for All Pelagics is the sum of the value for the Tuna, Other PPMUS and Miscellaneous categories as defined by Table 2.

The unadjusted revenues from commercial landings for the pelagic species subgroups above were adjusted for inflation by multiplying a given year's revenue by the 2000 consumer price index (CPI) divided by the CPI for that year.

		Revenue ($)			
		Tunas		Other PPMUS	
Year	CPI	Unadjust	Adjusted	Unadjust.	Adjusted
1982	100.0	$18,990	$32,112	$1,534	$2,594
1983	100.8	$58,561	$98,324	$5,828	$9,785
1984	102.7	$114,981	$189,259	$15,938	$26,234
1985	103.7	$95,157	$155,200	$26,800	$43,711
1986	107.1	$137,143	$216,548	$23,151	$36,555
1987	111.8	$110,076	$166,545	$6,347	$9,603
1988	115.3	$143,613	$210,680	$25,372	$37,221
1989	120.3	$111,425	$156,776	$9,901	$13,931
1990	129.6	$61,918	$80,864	$3,795	$4,956
1991	135.3	$93,060	$116,325	$18,525	$23,156
1992	140.9	$138,179	$165,815	$19,390	$23,268
1993	141.1	$84,341	$101,125	$23,700	$28,416
1994	143.8	$332,860	$391,444	$62,579	$73,593
1995	147.0	$312,638	$359,846	$71,891	$82,747
1996	152.5	$391,211	$433,853	$73,455	$81,461
1997	156.4	$919,535	$994,937	$154,121	$166,759
1998	158.4	$1,240,618	$1,324,980	$146,630	$156,600
1999	159.9	$1,018,884	$1,077,979	$153,750	$162,667
2000	166.7	$1,639,341	$1,663,931	$158,434	$160,811
2001	168.8	$8,235,979	$8,252,451	$199,269	$199,668
2002	169.2	$13,334,876	$13,334,876	$396,880	$396,880
Average	**134.8**	**$1,361,590**	**$1,405,899**	**$76,061**	**$82,887**
Std. Dev.	**23.81**	**$3,187,164**	**$3,176,052**	**$94,573**	**$93,676**

Figure 21. American Samoa average inflation-adjusted price for tunas and other PPMUS.



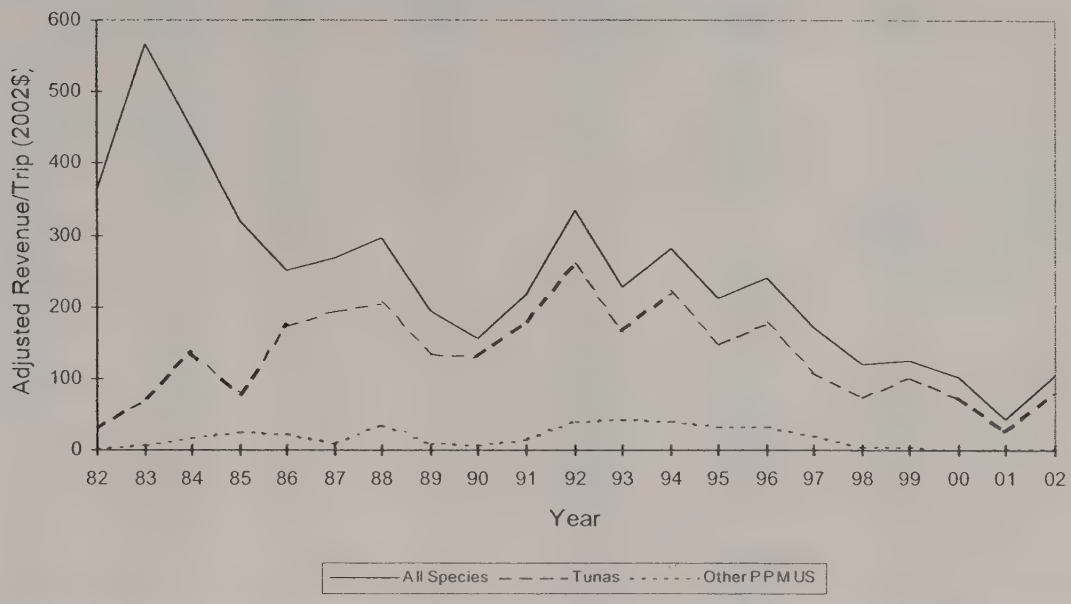
Interpretation: The average inflation-adjusted price per pound varied since 1982 until 1996 when a continuous decrease was seen. This gradual decrease may be due to the lower price that the canneries pay per pound of tuna compared to the price the local stores and restaurants pay. Additionally, its probably likely because of competition from frozen fish purchased from foreign longline vessels moored in Pago Harbor and from fishes imported from neighboring islands. Also, the amount of longline catches, during this period, that make it to the local markets probably contribute to this decline in prices for tuna.

	Average Price/Pound ($)			
	Tunas		Other PPMUS	
Year	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	$0.86	$1.46	$1.01	$1.71
1983	$0.69	$1.16	$1.31	$2.20
1984	$0.59	$0.97	$1.18	$1.95
1985	$0.95	$1.55	$1.53	$2.50
1986	$0.82	$1.29	$1.54	$2.44
1987	$0.83	$1.26	$1.31	$1.98
1988	$0.83	$1.22	$2.10	$3.07
1989	$0.97	$1.37	$1.20	$1.69
1990	$1.12	$1.46	$1.06	$1.39
1991	$1.62	$2.02	$1.22	$1.52
1992	$1.55	$1.86	$1.81	$2.17
1993	$1.94	$2.32	$1.69	$2.02
1994	$1.79	$2.10	$1.54	$1.81
1995	$1.13	$1.30	$1.35	$1.56
1996	$1.27	$1.40	$1.45	$1.60
1997	$1.17	$1.26	$1.54	$1.67
1998	$1.11	$1.19	$1.54	$1.65
1999	$1.07	$1.14	$1.40	$1.48
2000	$1.01	$1.02	$1.29	$1.31
2001	$1.06	$1.06	$1.29	$1.29
2002	$0.89	$0.89	$1.09	$1.09
Average	**$1.11**	**$1.40**	**$1.40**	**$1.82**
Std. Dev.	**$0.34**	**$0.38**	**$0.25**	**$0.46**

Calculation: The unadjusted price/pound for Tunas and Other PPMUS were calculated by dividing the sum of the values for the species in these categories as defined by Table 2 by the sum of their commercial landings or pounds.

The unadjusted price/pound values for the pelagic species subgroups above were adjusted for inflation by multiplying the given year's price/pound by the 2000 consumer price index (CPI) divided by the CPI for that year.

Figure 22. American Samoa average inflation-adjusted revenue per trip landing Pelagic Fish for trolling and troll/bottomfishing methods.



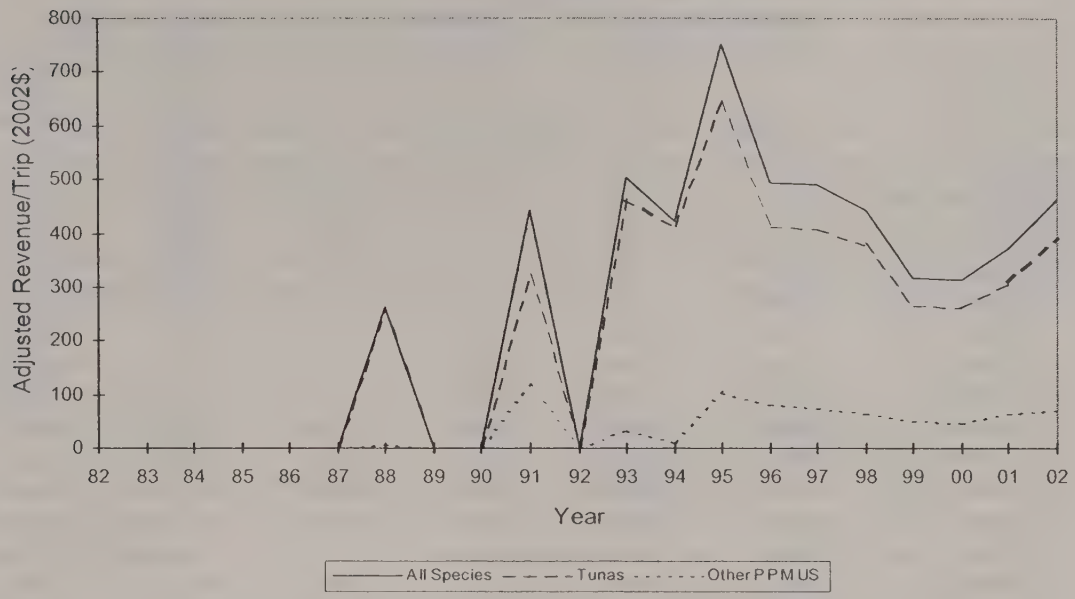
Interpretation: A gradual decrease in revenue per trip for trolling has been seen since 1994 for all species with a significant decrease 59% in 2001, setting a new record low. This gradual decrease in revenue per trip may be due to the overall decrease in price per pound for all pelagic species sold at the canneries and the local markets during this period. However in 2002, there was a significant increase in the revenue per trip for trolling of about 138%.

Calculation: The trolling and troll/bottom interviews in the offshore creel survey system landing any of the species listed in Table 1 are first counted for the given year to get the number of trips. The unadjusted revenue/trip for Tunas and Other PPMUS is calculated by first summing the value of the species in these pelagic subgroups caught by trolling or troll/bottomfishing methods and then dividing this by the number of trips. The unadjusted revenue/trip for all species is the sum of the value of all species, pelagic or not caught by the trolling and troll/bottom trips divided by the number of such trips.

The unadjusted revenue/trip values for the pelagic species subgroups above and for all species were adjusted for inflation by multiplying the given year's revenue/trip by the 2000 consumer price index (CPI) divided by the CPI for that year.

Year	All Species		Tunas		Other PPMUS	
	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.
1982	$363	$214	$27	$16	$2.2	$1.3
1983	$567	$338	$72	$43	$8.7	$5.2
1984	$451	$274	$135	$82	$17.3	$10.5
1985	$320	$196	$76	$47	$25.8	$15.8
1986	$250	$158	$175	$111	$23.5	$14.9
1987	$268	$177	$195	$129	$11.2	$7.4
1988	$295	$201	$205	$140	$35.6	$24.3
1989	$193	$137	$136	$97	$10.4	$7.4
1990	$157	$120	$131	$100	$7.1	$5.4
1991	$217	$173	$179	$143	$16.1	$12.9
1992	$335	$279	$257	$214	$41.8	$34.8
1993	$226	$189	$166	$139	$43.9	$36.6
1994	$281	$239	$219	$186	$40.2	$34.2
1995	$212	$184	$149	$130	$32.3	$28.1
1996	$239	$216	$177	$160	$33.8	$30.5
1997	$171	$158	$109	$101	$19.3	$17.8
1998	$119	$112	$75	$70	$5.8	$5.4
1999	$125	$118	$102	$97	$4.9	$4.6
2000	$102	$101	$75	$74	$0.8	$0.8
2001	$44	$44	$26	$26	$1.9	$1.9
2002	$105	$105	$81	$81	$3.4	$3.4
Average	**$240**	**$178**	**$132**	**$104**	**$18.4**	**$14.4**
Std. Dev.	**$121**	**$67**	**$61**	**$49**	**$14.2**	**$11.9**

Figure 23. American Samoa average inflation-adjusted revenue per trip landing PPMUS for Alias using the longline method.



Interpretation: The longline revenue per trip has seen a gradual decrease since 1995, but in 1999 there was a stable trend until 2001 and 2002. The increase of revenue per trip in 2002 may have been the result of the increase in pounds landed this year. The "All species" listed in the caption of this illustration includes non-pelagic species caught in the fishery. The decrease in prices set by the canneries and the increase in revenues clearly indicates the large number of fish being caught and sold to the canneries generating the high revenues per trip this year.

Calculation: The longlining interviews in the offshore creel survey system landing any of the species listed in Table 1 are first counted for the given year to get the number of trips. The unadjusted revenue/trip for Tunas and Other PPMUS is calculated by first summing the value of the species in these pelagic subgroups caught by longlining and then dividing this by the number of trips. The unadjusted revenue/trip for all species is the sum of the value of all species, pelagic or not , caught by the longlining trips divided by the number of such trips.

The unadjusted revenue/trip values for the pelagic species subgroups above and for all species were adjusted for inflation by multiplying the given year's revenue/trip by the 2000 consumer price index (CPI) divided by the CPI for that year.

Year	All Species		Tunas		Other PPMUS	
	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.
1982	$0	$0	$0	$0	$0.0	$0.0
1983	$0	$0	$0	$0	$0.0	$0.0
1984	$0	$0	$0	$0	$0.0	$0.0
1985	$0	$0	$0	$0	$0.0	$0.0
1986	$0	$0	$0	$0	$0.0	$0.0
1987	$0	$0	$0	$0	$0.0	$0.0
1988	$261	$178	$254	$173	$6.9	$4.7
1989	$0	$0	$0	$0	$0.0	$0.0
1990	$0	$0	$0	$0	$0.0	$0.0
1991	$442	$354	$321	$257	$115	$91.8
1992	$0	$0	$0	$0	$0.0	$0.0
1993	$503	$419	$462	$385	$33.5	$27.9
1994	$422	$359	$411	$349	$10.8	$9.2
1995	$752	$653	$643	$559	$104	$90.1
1996	$495	$446	$411	$371	$81.5	$73.5
1997	$490	$453	$408	$377	$76.3	$70.5
1998	$443	$415	$378	$354	$64.3	$60.2
1999	$318	$301	$265	$251	$52.3	$49.4
2000	$313	$308	$263	$259	$49.2	$48.5
2001	$370	$370	$306	$305	$63.7	$63.6
2002	$464	$464	$390	$390	$72.8	$72.8
Average	**$351**	**$315**	**$301**	**$269**	**$48.6**	**$44.1**
Std. Dev.	**$206**	**$186**	**$177**	**$158**	**$37.3**	**$33.0**

Appendix 2

Guam

Introduction/ Summary

Pelagic fishing vessels based on Guam are classified into two general groups: 1) distant-water purse seiners and longliners that fish a majority of the time outside Guam's EEZ (Economic Exclusive Zone) and transship through the island and 2) small, primarily recreational, trolling boats that are either towed to boat launch sites or berthed in marinas and fish only within local waters, either within Guam's EEZ or on some occasions in the adjacent EEZ of the Northern Mariana Islands. This annual report covers primarily the local, on-island, small-boat, pelagic fishery.

The quantity of boats involved in Guam's pelagic or open ocean fishery gradually increased from 193 in 1983 to 469 in 1998 and has dropped since. A majority of the fishing boats are less than 10 meters (33 feet) in length and are usually owner-operated by fishermen who earn a living outside of fishing. Most fishermen sell a portion of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. A small, but significant, segment of the pelagic group is made up of marina-berthed charter boats that are operated primarily by full-time captains and crews. Data and graphs for non-charters, charters, and bycatch are represented in this report. NC will be used to represent non-charters while C will be used to represent charters.

The estimated annual pelagic landings have varied widely, ranging between 322,000 and 937,000 pounds. Total pelagic landings in 2002 were approximately 533,855 pounds, a decrease of 42% compared with 2001. Landings in 2002 consisted almost entirely of five major species: mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), skipjack tuna *(Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), and Pacific blue marlin (*Makaira mazara*). Minor components include rainbow runner *(Elagatis bipinnulatus*), great barracuda (*Sphyraena barracuda*), kawakawa (*Euthynnus affinis*), sailfish *(Istiophorus platypterus*), dogtooth tuna (*Gymnosarda unicolor*), and a number of species of shark. Approximately a dozen additional species are landed incidentally each year.

There are wide year-to-year drops in the tuna, marlin, and wahoo landings. Yellowfin tuna landings increased from 1983 to 1985, declined from 1985 to 1987, increased from 1987 to 1998, and then decreased after 1999. Skipjack tuna landings declined until 1987, showed a general increase until 1996, generally declined until 1999, and then reached a record high of approximately 333,000 in 2001. Blue marlin landings showed a general increase from 1983 to 1990, decreased from 1990 to 1993, increased from 1993 to 1997, then fluctuated. Wahoo landings have fluctuated over the past 20 years.

Aggregate landings of all pelagics, tuna, and non-tuna Pelagic Management Species (PMUS) dropped significantly, but appear to be increasing. Non-tuna PMUS, primarily mahimahi, make up the mass of the pelagic catch. The commercial landings of all pelagics also show a similar trend.

The average number of troll trips, trolling hours, and trolling effort, in terms of total hours fished per total trolling trips, all decreased compared with 2001. Charter boat activity dropped for the fifth year in a row, due to a decrease in tourism as a result of many factors including economic recession in Japan, continued threat of terrorist activities following September 11, and the after-effects of the two most recent devastating typhoons "Chata'an" and "Pongsona". Charter trolling trips dropped 10% in 1999, 7% in 2000, 20% in 2001 and 26% for 2002. Charter boats, which made up less than 10% of the pelagic fleet, accounted for 16% of all trolling trips, 9% of the pelagic catch, and 13% of hours, spent trolling. Charter boats caught 10% of the mahimahi landings, 8% of the blue marlin landings, 8% of the skipjack landings, 4% of the yellowfin landings, and 16% of the wahoo landings.

Trolling catch rates vary widely for all pelagic species. In 2002, the trolling catch rate increased for yellowfin (↑10%), mahimahi (↑31%), and blue marlin (↑117%) while there was a decrease for wahoo (↓19%) and skipjack tuna (↓26%). Average total CPUE for non-charter and charter boats combined increased <1% compared with 2001.

Total commercial landings and commercial revenues for all pelagics, tunas, and non-tuna PMUS decreased in 2002. However, there was a slight increase in revenues per trolling trip for all pelagics and tunas (revenues per trolling trip for non-tuna PMUS showed a slight decline). The average price of tuna and non-tuna PMUS show a general decline over the past 20 years. However, since the majority of participants in the pelagic fishery do not rely on catching or selling fish for their primary source of income, effort will continue despite decreasing revenues.

For 2002, the total estimated number of by-catch was 6 pieces or 0.15% of the total trolling catch. The by-catch consisted of three species: black-tip shark (*Carcharinus melanopterus*), skipjack tuna (*Katsuwonus pelamis*), and yellowfin tuna (*Thunnus albacares*).

2003 Recommendations

1. Update both computer hardware and software semi-annually, based on availability of funding.

2. Add more incentives to current and potential vendors to participate in the receipt book program.

3. Explore the feasibility of drafting new legislation requiring local fish vendors to participate in the "Commercial Fish Receipt Book Program".

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Table 1. Guam 2002 creel survey - pelagic species composition

Species	Pounds Landed	Non-charter	Charter
Mahimahi	172,674	155,800	16,874
Wahoo	71,810	60,654	11,156
Blue Marlin	53,553	49,013	4,540
Striped Marlin	0	0	0
Sailfish	2,285	2,285	0
Shortbill Spearfish	0	0	0
Dogtooth Tuna	1,729	1,729	0
Double-lined Mackerel	55	55	0
Subtotal PMUS	302,106	269,536	32,570
Skipjack Tuna	175,836	163,120	12,716
Yellowfin Tuna	44,932	43,202	1,730
Bigeye Tuna	0	0	0
Kawakawa	630	357	273
Other Tuna	0	0	0
Subtotal Tunas	221,398	206,679	14,719
Rainbow Runner	6,331	5,911	419
Barracudas	3,499	3,499	
Monchong	521	521	
Other	0	0	0
Subtotal Misc.	10,351	9,931	419
Assorted Troll Fish	0	0	0
Total Pelagic	533,855	486,146	47,708

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey

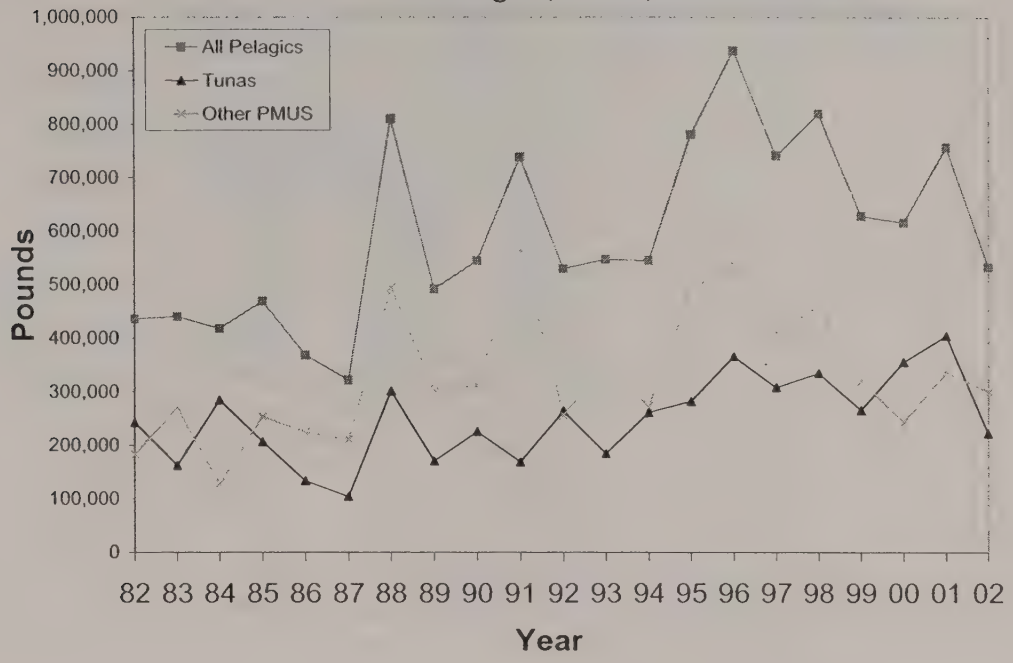
Note: This table includes the double-lined mackerel and 3 minor species of barracudas that are not included in the other tables for pelagic landings, therefore totals differ slightly.

Table 2. Guam 2002 Annual Commercial Average Price of Pelagic Species	
Species	2002 Average Price ($/lb.)
Troll fish	1.46
Barracuda	1.88
Dolphin (mahimahi)	1.63
Marlin	1.23
Spearfish	1.13
Sailfish	1.17
Rainbow runner	1.81
Monchong	2.32
Wahoo	1.99
Skipjack tuna	1.17
Dogtooth tuna	1.23
Yellowfin tuna	1.85
Kawakawa	1.17
All Pelagic Species	1.52
Tunas:	1.33
Other PMUS :	1.66

Source: The WPacFIN-sponsored commercial landings system.

Table 3. For reference only. Annual consumer price indexes and CPI adjustment factors.		
Year	CPI	CPI Adjustment Factor
1980	134.0	3.75
1981	161.4	3.11
1982	169.7	2.96
1983	175.6	2.86
1984	190.9	2.63
1985	198.3	2.53
1986	203.7	2.46
1987	212.7	2.36
1988	223.8	2.24
1989	248.2	2.02
1990	283.5	1.77
1991	312.5	1.61
1992	344.2	1.46
1993	372.9	1.35
1994	436.0	1.15
1995	459.2	1.09
1996	482.0	1.04
1997	489.7	1.03
1998	487.1	1.03
1999	496.0	1.01
2000	505.9	0.99
2001	499.4	1.01
2002	502.0	1.00

Figure 1a. Guam Annual estimated total landings: All Pelagics, Tunas, and Other PMUS



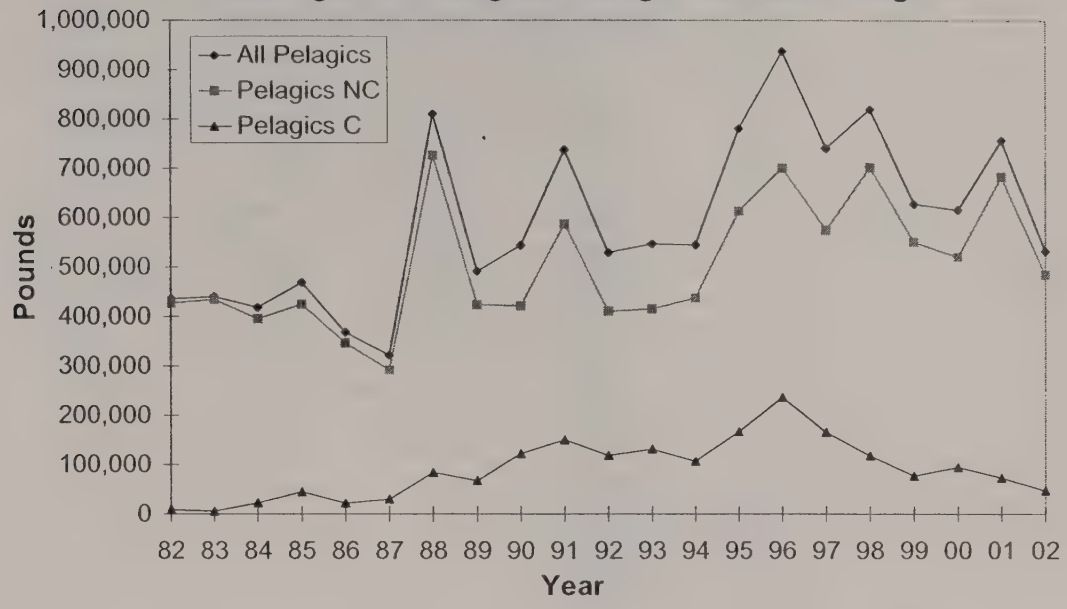
Interpretation: The general trend of the estimated total landings has shown an increase until 1996. Since that time there has been a general decrease in estimated total landings, coinciding with a decrease in trolling boat activity. Tunas and other PMUS consisted of 42% and 56% of the total pelagic landings in 2002, respectively. The total pelagic landings, tuna landings, and other PMUS landings decreased 30%, 45%, and 11% from 2001, respectively. The decrease is most likely due to the two most recent destructive typhoons hitting the island in July and December of 2002.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey.

Calculation: A 365-day (366 days during leap years) expansion is run for each calendar year of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Pounds Landed			
Year	All Pelagics	Tunas	Other PMUS
82	435,648	243,184	182,782
83	440,319	162,334	270,536
84	418,010	284,871	127,711
85	468,917	207,027	253,551
86	368,355	133,570	224,390
87	321,846	104,534	210,663
88	810,303	301,785	494,864
89	491,694	170,722	303,357
90	544,457	225,926	311,622
91	737,898	168,800	566,353
92	529,634	264,392	256,282
93	547,240	184,532	356,682
94	544,922	261,665	272,697
95	780,727	282,587	489,614
96	937,450	365,855	541,991
97	740,790	308,538	410,487
98	820,007	334,991	460,380
99	627,928	265,941	320,802
00	615,724	355,710	243,470
01	756,844	404,986	337,090
02	532,697	223,125	300,841
Average	593,877	250,242	330,294
Standard Deviation	168,345	79,870	121,090

Figure 1b. Guam annual estimated total pelagics landings: All Pelagics, Pelagic NC, and Pelagic C



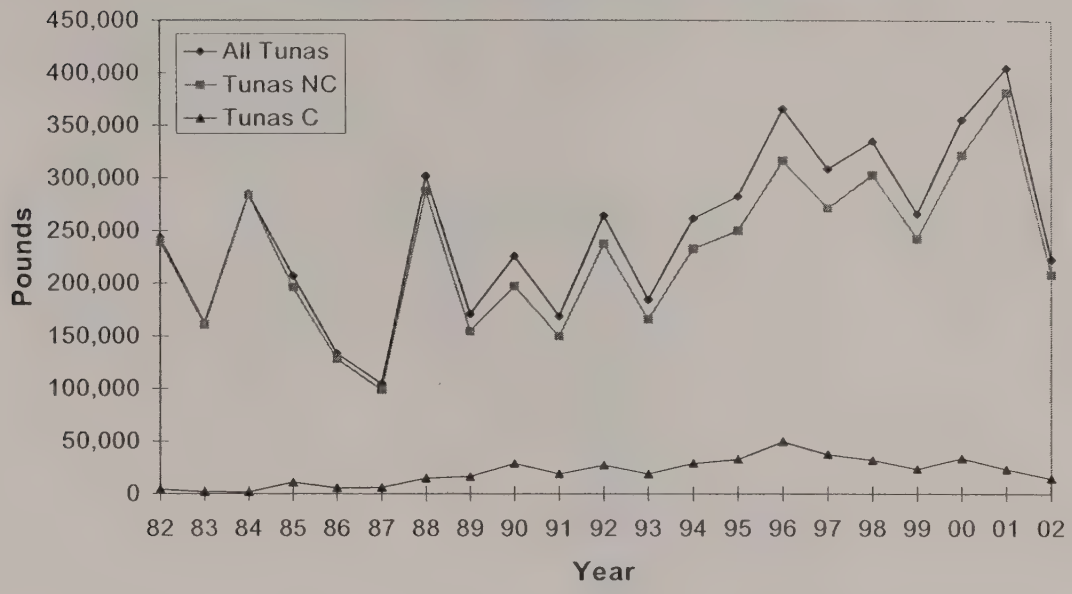
Interpretation: NC will be used to define non-charters, while C will be used to define charters. The general trend of the estimated total pelagics landings has shown an increase until 1996. Since that time there has been a general decrease in estimated total pelagics landings, coinciding with a decrease in trolling boat activity. Non-charter trolling trips account for the bulk of the pelagic catch. Prior to 1988, non-charters accounted for over 90% of the catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1996, a general decrease in charter landings has been observed, while no trend is apparent for non-charters. For 2002, pelagic non-charters accounted for 91% of the total pelagic catch, while pelagic charters accounted for 9%. In 2002, pelagic landings from non-charters decreased 29% and pelagic landings from charters decreased 35% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey.

Calculation: A 365-day (366 days during leap years) expansion is run for each calendar year of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Pounds Landed			
Year	All Pelagics	Pelagic NC	Pelagic C
82	435,648	426,939	8,709
83	440,319	434,664	5,655
84	418,010	395,649	22,361
85	468,917	424,389	44,528
86	368,355	346,616	21,740
87	321,846	291,913	29,933
88	810,303	726,274	84,029
89	491,694	424,043	67,651
90	544,457	421,797	122,660
91	737,898	587,400	150,498
92	529,634	410,966	118,667
93	547,240	415,432	131,809
94	544,922	437,735	107,187
95	780,727	613,379	167,347
96	937,450	700,709	236,741
97	740,790	574,977	165,812
98	820,007	701,672	118,335
99	627,928	550,613	77,314
00	615,724	520,734	94,990
01	756,844	683,341	73,503
02	532,697	484,989	47,709
Average	593,877	503,535	90,342
Standard Deviation	168,345	126,238	60,444

Figure 1c. Guam annual estimated tuna landings: All Tunas, Tunas NC, and Tunas C



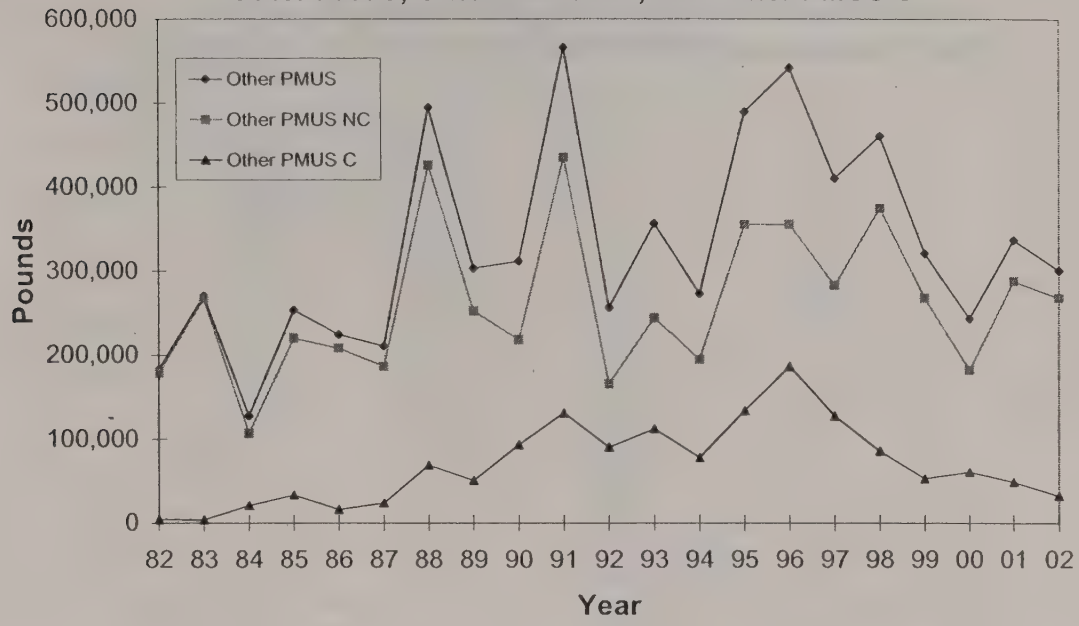
Interpretation: The general trend of the estimated total tuna landings has increased over the past 15 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the tuna catch. In the 1980's, non-charters accounted for over 95% of the catch. This percentage decreased due to an increase in charter boat activity in the late 1980's. For 2002, non-charters again accounted for a large percentage of the total tuna catch (93%), while charters accounted for just 7%. In 2002, tuna landings from non-charters decreased 45% and tuna landings from charters decreased 37% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

Calculation: A 365-day (366 days during leap years) expansion is run for each calendar year of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Pounds Landed			
Year	All Tunas	Tunas NC	Tunas C
82	243,184	239,082	4,102
83	162,334	160,613	1,721
84	284,871	283,312	1,559
85	207,027	196,020	11,007
86	133,570	128,201	5,369
87	104,534	98,820	5,714
88	301,785	286,974	14,811
89	170,722	154,355	16,366
90	225,926	197,255	28,672
91	168,800	149,735	19,065
92	264,392	237,257	27,135
93	184,532	165,705	18,827
94	261,665	232,747	28,918
95	282,587	249,901	32,686
96	365,855	316,394	49,462
97	308,538	271,288	37,250
98	334,991	302,903	32,089
99	265,941	242,440	23,501
00	355,710	322,057	33,652
01	404,986	381,579	23,406
02	223,125	208,405	14,719
Average	250,242	229,764	20,478
Standard Deviation	79,870	72,143	13,000

Figure 1d. Guam annual estimated total other PMUS landings: Other PMUS, Other PMUS NC, and Other PMUS C



Interpretation: The general trend of the estimated total other PMUS landings has generally increased over the past 18 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the other PMUS catch. In the 1980's, other PMUS non-charters accounted for over 87% of the catch. This percentage decreased due to an increase in charter boat activity in the late 1980's. From 1996, a decrease in other PMUS charter landings has been observed, while no trend is apparent for other PMUS non-charters. For 2002, other PMUS non-charters accounted for 89% of the total other PMUS catch, while other PMUS charters accounted for 11%. In 2002, other PMUS landings from non-charters decreased 7% and those from charters decreased 34% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

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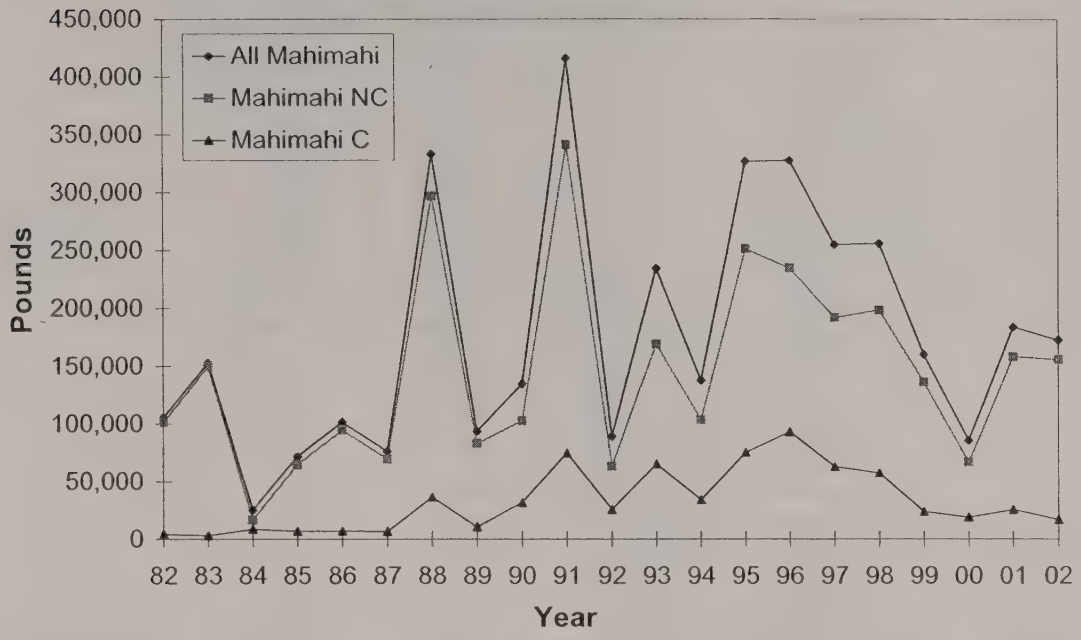
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

Calculation: A 365-day (366 days during leap years) expansion is run for each calendar year of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

	Pounds Landed		
Year	Other PMUS	Other PMUS NC	Other PMUS C
82	182,782	178,551	4,231
83	270,536	266,602	3,934
84	127,711	106,910	20,802
85	253,551	220,043	33,508
86	224,390	208,111	16,279
87	210,663	186,706	23,957
88	494,864	425,850	69,015
89	303,357	252,395	50,961
90	311,622	218,154	93,468
91	566,353	435,148	131,205
92	256,282	165,882	90,400
93	356,682	244,215	112,467
94	272,697	194,674	78,022
95	489,614	355,532	134,082
96	541,991	355,315	186,675
97	410,487	282,828	127,659
98	460,380	374,650	85,730
99	320,802	267,823	52,979
00	243,470	182,533	60,937
01	337,090	288,092	48,998
02	300,841	268,271	32,570
Average	330,294	260,871	69,423
Standard Deviation	121,090	87,156	48,934

Figure 2a. Guam annual estimated total mahimahi landings: All Mahimahi, Mahimahi NC, and Mahimahi C



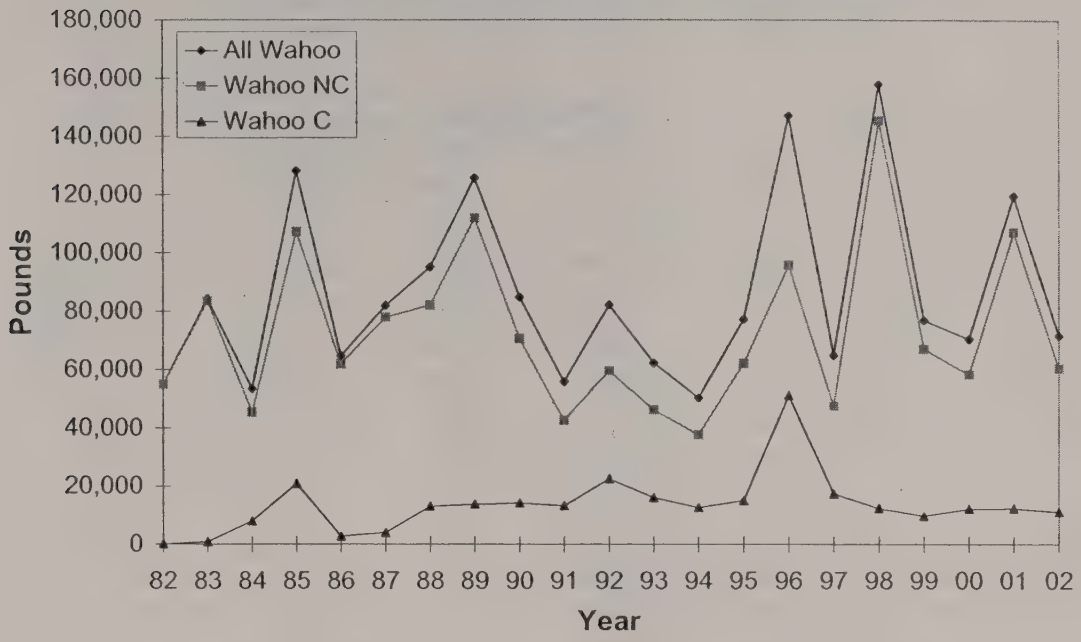
Interpretations: The general trend of the estimated mahimahi landings has increased over the past 18 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the mahimahi catch. Prior to 1988, mahimahi non-charters accounted for over 90% of the catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1995, a general decrease in mahimahi non-charter landings has been observed. A similar decrease has been observed from 1996 in mahimahi charter landings. In 2002, mahimahi landings from non-charters decreased 2% and mahimahi landings from charters decreased 34% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Pounds Landed			
Year	All Mahimahi	Mahimahi NC	Mahimahi C
82	105,503	101,348	4,155
83	152,678	149,531	3,147
84	25,420	16,739	8,681
85	71,569	64,619	6,951
86	101,487	94,646	6,841
87	76,129	69,326	6,803
88	333,393	296,937	36,456
89	93,709	83,069	10,640
90	134,747	102,838	31,910
91	416,053	341,358	74,695
92	89,115	63,259	25,856
93	234,522	169,200	65,322
94	137,768	103,448	34,320
95	326,868	251,367	75,501
96	327,635	234,575	93,060
97	254,806	191,864	62,942
98	255,814	198,425	57,389
99	160,150	136,229	23,921
00	85,827	66,798	19,029
01	184,009	158,408	25,601
02	172,673	155,798	16,874
Average	178,089	145,228	32,862
Standard Deviation	105,978	83,733	27,577

Figure 2b. Guam annual estimated total wahoo landings: All Wahoo, Wahoo NC, and Wahoo C



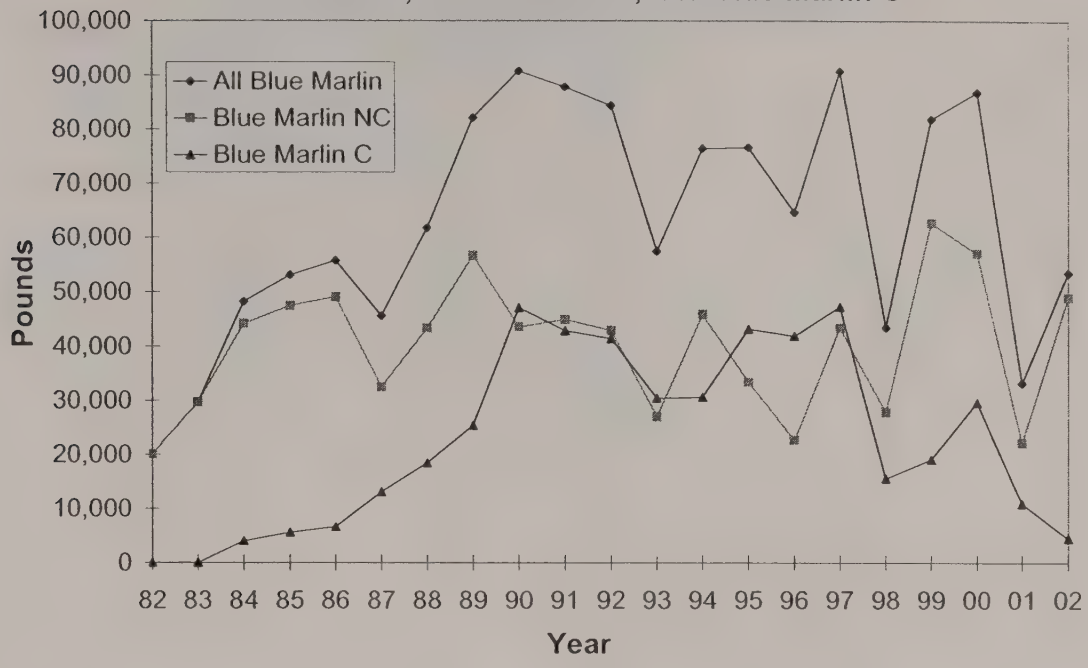
Interpretations: The wide fluctuations in wahoo landings are probably due to the high variability in the year-to-year abundance and availability of the stocks. Until 1987, most wahoo non-charter landings accounted for over 95% of the total catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1988 to 1998, wahoo non-charter landings have fluctuated, accounting for 65% - 92% of the total catch. The general trend of wahoo charter landings has slightly increased since 1986. In 1996, wahoo charter landings reached a high, accounting for 35% of the total catch, and have generally decreased since then. For 2002, non-charters accounted for 84% of the wahoo catch, while charters accounted for 16%. In 2002, wahoo landings from non-charters decreased 43% and wahoo landings from charters decreased 10% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Pounds Landed			
Year	All Wahoo	Wahoo NC	Wahoo C
82	54,976	54,900	75
83	84,349	83,562	786
84	53,490	45,424	8,066
85	128,209	107,275	20,934
86	64,756	61,985	2,771
87	82,024	78,000	4,024
88	95,180	82,107	13,073
89	125,720	112,006	13,714
90	84,873	70,698	14,176
91	55,952	42,681	13,270
92	82,238	59,675	22,563
93	62,373	46,318	16,055
94	50,390	37,712	12,677
95	77,325	62,224	15,102
96	147,181	95,884	51,297
97	64,956	47,538	17,418
98	157,947	145,524	12,424
99	76,958	67,170	9,788
00	70,614	58,436	12,178
01	119,602	107,185	12,417
02	71,809	60,654	11,155
Average	86,234	72,712	13,522
Standard Deviation	31,435	27,656	10,468

Figure 3a. Guam annual estimated total blue marlin landings: Blue Marlin, Blue Marlin NC, and Blue Marlin C



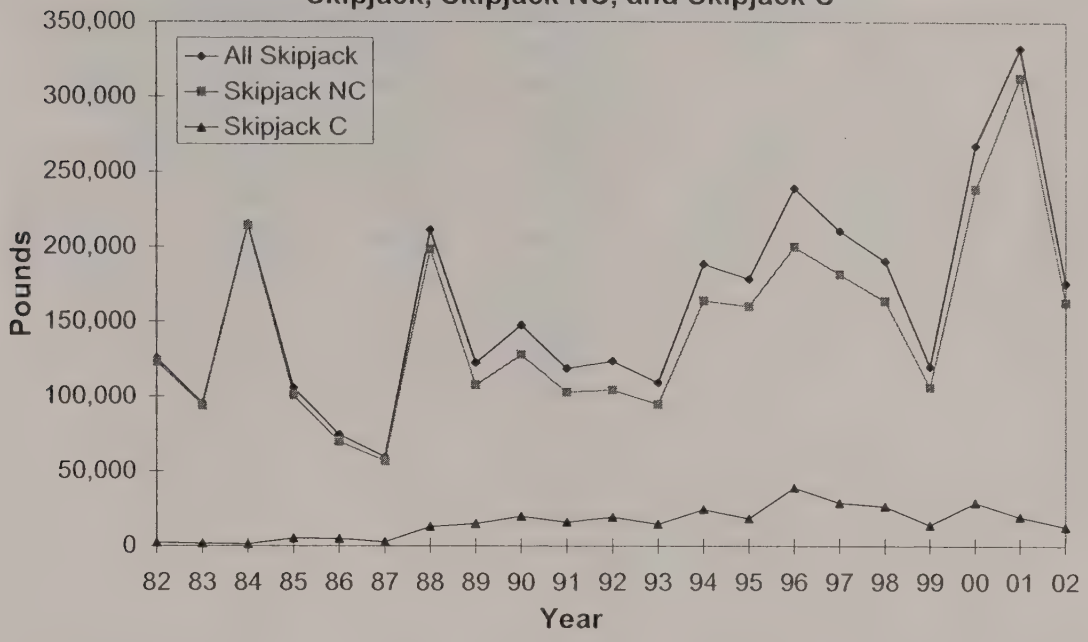
Interpretations: During the 1980's, non-charters accounted for the bulk of the marlin catch. In the early 1990's, charters began to account for about 50% of the total catch. In the middle 1990's, charters began to account for most of the catch. These increases are due to the increase in charter boat activity. The decrease in charter landings after 1997 is due to the decrease in charter trips. For 2002, non-charters accounted for 92% of the blue marlin catch, while charters accounted for 8%. In 2002, blue marlin landings from non-charters increased 120%, but landings from charters decreased 59% compared with landings in 2001. The wide fluctuations in blue marlin landings from non-charters are probably due to the high variability in the year-to-year abundance and availability of the stocks. Decreases in landings for charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Pounds Landed			
Year	All Blue Marlin	Blue Marlin NC	Blue Marlin C
82	20,086	20,086	0
83	29,688	29,688	0
84	48,239	44,185	4,055
85	53,117	47,494	5,623
86	55,766	49,099	6,667
87	45,620	32,490	13,130
88	61,816	43,342	18,474
89	82,120	56,721	25,399
90	90,749	43,600	47,148
91	87,838	44,941	42,897
92	84,356	42,937	41,419
93	57,530	27,046	30,484
94	76,514	45,889	30,625
95	76,637	33,451	43,186
96	64,677	22,742	41,935
97	90,726	43,427	47,299
98	43,511	27,886	15,625
99	81,888	62,724	19,164
00	86,891	57,161	29,730
01	33,253	22,274	10,979
02	53,552	49,012	4,540
Average	63,075	40,295	22,780
Standard Deviation	21,544	12,163	16,578

Figure 4a. Guam annual estimated total skipjack landings: Skipjack, Skipjack NC, and Skipjack C



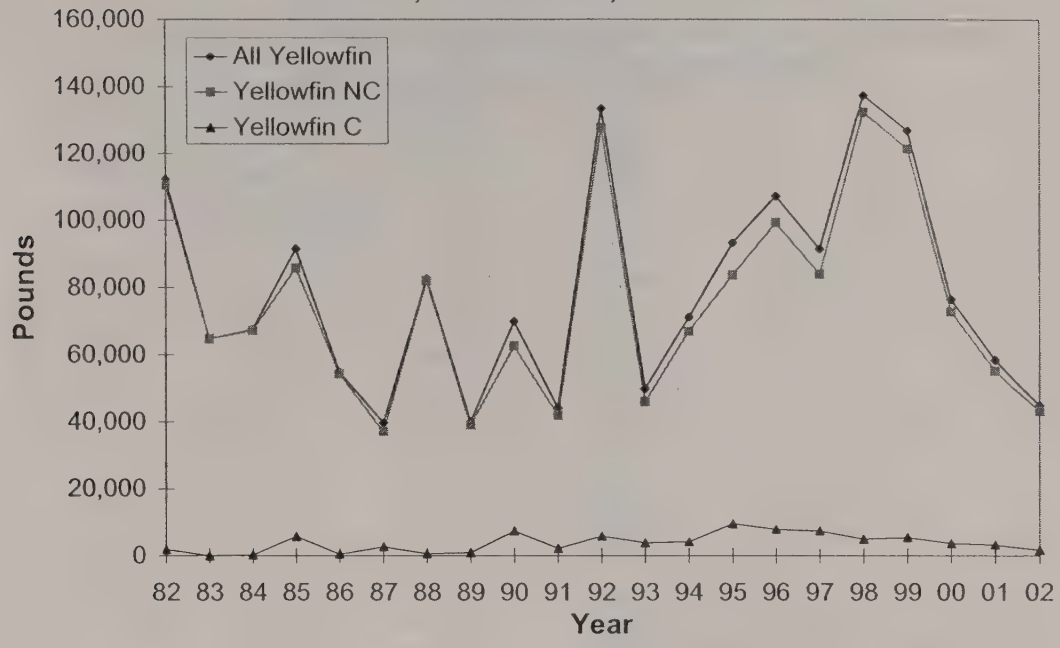
Interpretations: The estimated total landings have generally increased in the past 15 years, coinciding with an increase in trolling boat activity. Prior to 1988, non-charter trolling trips accounted for over 90% of the pelagic catch. Because of an increase in charter activity in 1988, charters began to account for up to 16% of the skipjack tuna landings. For 2002, non-charters accounted for 93% of the skipjack catch, while charters accounted for 7%. In 2002, skipjack landings from non-charters decreased 48% and landings from charters decreased 35% compared with landings in 2001. Decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Pounds Landed			
Year	All Skipjack	Skipjack NC	Skipjack C
82	125,472	123,247	2,225
83	95,449	93,796	1,652
84	215,102	213,937	1,165
85	105,754	100,732	5,022
86	74,450	69,642	4,808
87	59,569	56,908	2,661
88	211,014	198,085	12,929
89	122,588	107,678	14,910
90	147,702	127,870	19,832
91	118,799	102,967	15,832
92	123,731	104,504	19,227
93	109,244	94,713	14,532
94	188,408	163,937	24,471
95	178,404	160,052	18,353
96	239,006	199,958	39,048
97	210,535	181,605	28,930
98	190,466	163,858	26,609
99	120,137	106,199	13,938
00	267,562	238,529	29,033
01	332,677	313,173	19,504
02	175,834	163,118	12,716
Average	162,472	146,881	15,590
Standard Deviation	67,990	62,360	10,390

Figure 4b. Guam annual estimated total yellowfin landings: Yellowfin, Yellowfin NC, and Yellowfin C



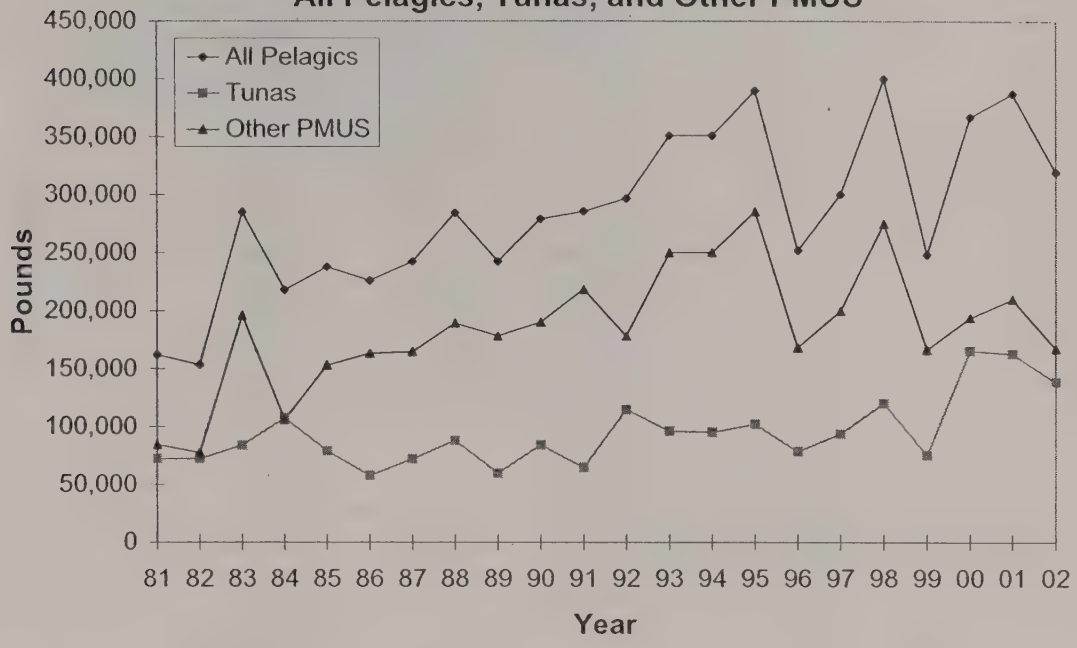
Interpretations: The estimated total yellowfin landings by non-charters have decreased rather substantially from 1998 to 2002, while landings from charters have shown a less pronounced decline since 1995. Non-charter trolling trips account for the bulk of the yellowfin catch. For 2002, non-charters accounted for 96% of the yellowfin catch while charters accounted for 4%. In 2002, yellowfin landings from non-charters decreased 22% and landings from charters decreased 47% compared with landings in 2001. The wide fluctuations in yellowfin landings from non-charters, over the past 20 years, are probably due to the high variability in the year-to-year abundance and availability of the stocks. However, for 2002, decreases in landings for both non-charters and charters may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods for all years except 1992-93 as described in Figure 1.

Pounds Landed			
Year	All Yellowfin	Yellowfin NC	Yellowfin C
82	112,287	110,410	1,877
83	64,684	64,684	0
84	67,463	67,207	256
85	91,560	85,813	5,748
86	54,781	54,297	485
87	39,766	37,061	2,705
88	82,549	81,985	565
89	39,967	39,048	920
90	69,952	62,519	7,433
91	44,073	41,865	2,208
92	133,397	127,508	5,889
93	49,973	46,053	3,920
94	71,081	66,899	4,183
95	93,329	83,703	9,626
96	107,244	99,343	7,901
97	91,455	83,982	7,474
98	137,395	132,388	5,008
99	126,858	121,398	5,460
00	76,528	72,828	3,700
01	58,445	55,207	3,238
02	44,932	43,202	1,730
Average	78,939	75,114	3,825
Standard Deviation	30,724	29,380	2,818

Figure 5. Guam annual estimated commercial landings: All Pelagics, Tunas, and Other PMUS



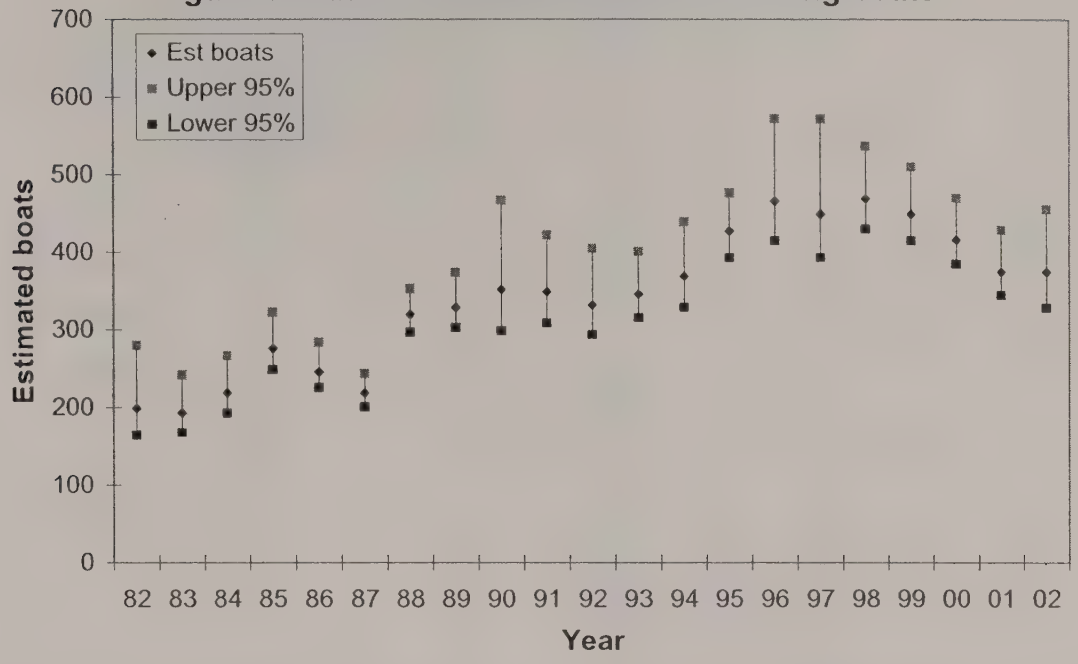
Interpretations: Commercial pelagic fishery landings have shown a general increase over the last 20 years. However, in 2002, estimated commercial landings decreased overall by 17%, with a 15% decrease for tuna landings and a 20% decrease for landings of other PMUS. Decreases in commercial pelagic fishery landings may be due to a decrease in trolling effort, possibly caused by bad weather days.

Source: The WPACFIN-sponsored commercial landings system.

Calculation: Total commercial landings were estimated by summing the weight fields in the commercial landings database from the principle fish wholesalers on Guam, and then multiplying by an estimated percent coverage expansion factor. The annual expansion factor was subjectively created based on as much information as possible depending on the year, including: an analysis of the "disposition of catch" data available from the DAWR offshore creel survey; an evaluation of the fishermen in the fishery and their entry/exit patterns; general "dock side" knowledge of the fishery and the status of the marketing conditions and structure; the overall number of records in the data base; and a certain measure of best guesses.

Pounds Landed			
YEAR	All pelagics	Tunas	Other PMUS
81	162,186	72,229	84,371
82	153,577	72,347	77,602
83	285,118	83,764	196,182
84	218,028	107,568	106,218
85	237,695	79,028	153,076
86	226,138	57,689	163,291
87	242,444	72,004	164,809
88	284,408	88,093	189,455
89	242,554	59,825	178,424
90	279,121	84,176	190,201
91	285,696	64,694	218,588
92	296,809	114,765	178,307
93	351,201	96,289	250,211
94	351,187	95,321	250,348
95	389,849	102,236	285,481
96	252,075	78,636	168,425
97	300,385	93,825	200,080
98	400,200	120,186	275,168
99	248,472	75,346	166,699
00	367,143	165,898	194,261
01	387,368	163,369	210,244
02	319,800	139,009	167,880
Average	285,521	94,832	184,969
Std.deviation	69,160	30,225	53,343

Figure 6. Guam estimated number of trolling boats



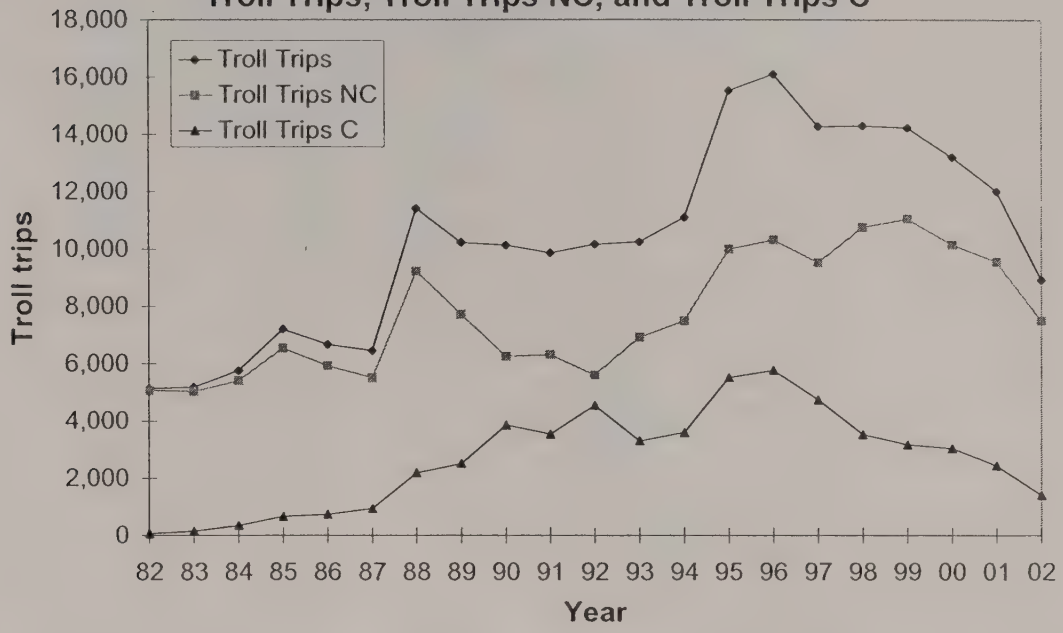
Interpretations: The number of trolling boats on Guam has been steadily increasing, especially since the addition of two marinas to the offshore sampling program. There appears to be a general increase in the number of small boats participating in Guam's pelagic fishery, while the number of charter vessels has remained fairly constant for several years. In 2002, the number of estimated trolling boats stayed at 375, with an upper 95% non-parametric confidence limit of 456 and a lower confidence limit of 329.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Since only a fraction of the days of the year are sampled, it is not possible to know the exact number of boats participating in the fishery. The 1998 trolling boat log was converted and processed through a boat estimator model 1,000 times. There were 1,315 logged trolling trips made by 383 different vessels, counted on 91 sample days.

Estimated Number of Boats			
Year	Est. Boats	Upper 95 %	Lower 95 %
82	199	280	165
83	193	242	168
84	219	267	193
85	276	323	249
86	246	284	226
87	219	244	201
88	320	353	297
89	329	374	303
90	352	467	299
91	349	422	309
92	332	405	294
93	346	401	316
94	369	439	329
95	427	476	393
96	466	572	415
97	449	572	393
98	469	537	430
99	449	510	415
00	416	470	385
01	375	429	345
02	375	456	329
Average	349	412	314
Standard Deviation	85	102	78

Figure 7a. Guam annual estimated number of Troll Trips, Troll Trips NC, and Troll Trips C



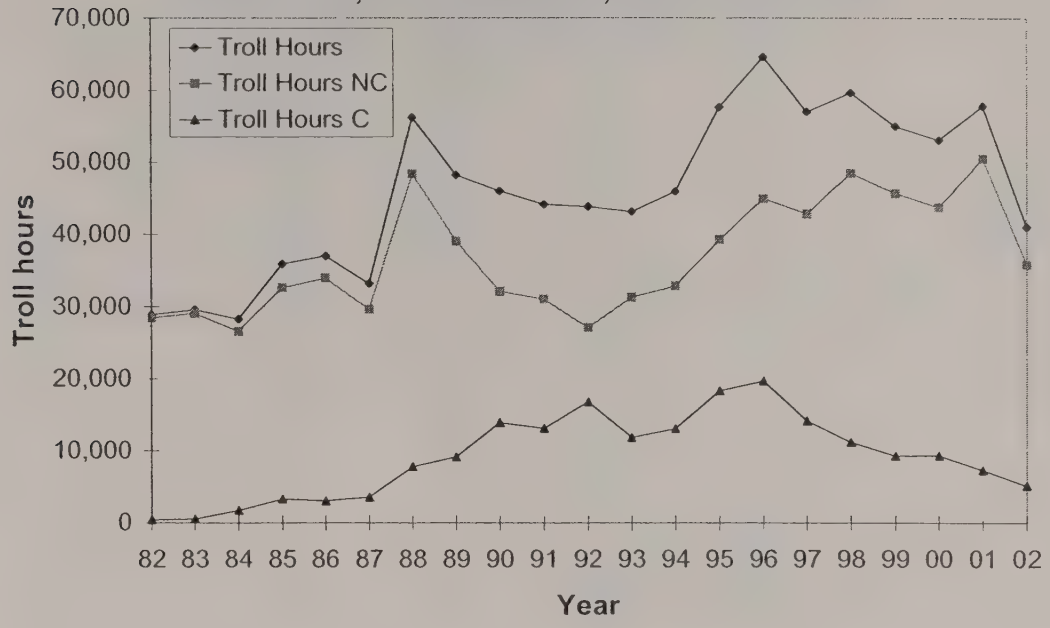
Interpretations: Although, non-charter and charter troll trips have generally increased over the past 20 years, both have decreased in the past 4 years. The decreases are most likely due to a continuing economic recession on the island. In 2002, non-charter troll trips dropped 21%, charter troll trips dropped 42%, and overall troll trips dropped 26%. Non-charter trips made up 84% of total troll trips, while charters made up 16%. Decreases for 2002 may also be due to bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated number of trips for the trolling method as taken directly from creel survey expansion system printouts.

Year	Troll trips	Troll trips NC	Troll trips C
82	5,138	5,078	60
83	5,187	5,039	148
84	5,763	5,411	353
85	7,209	6,544	665
86	6,677	5,932	744
87	6,458	5,513	945
88	11,412	9,221	2,192
89	10,230	7,714	2,515
90	10,130	6,264	3,865
91	9,870	6,325	3,545
92	10,165	5,614	4,551
93	10,247	6,931	3,316
94	11,103	7,497	3,606
95	15,528	10,000	5,528
96	16,098	10,317	5,781
97	14,279	9,528	4,751
98	14,295	10,758	3,537
99	14,233	11,053	3,180
00	13,204	10,152	3,052
01	12,016	9,563	2,453
02	8,933	7,512	1,421
Average	10,389	7,713	2,677
Standard Deviation	3,422	2,065	1,753

Figure 7b. Guam annual estimated number of Troll Hours, Troll Hours NC, Troll Hours C



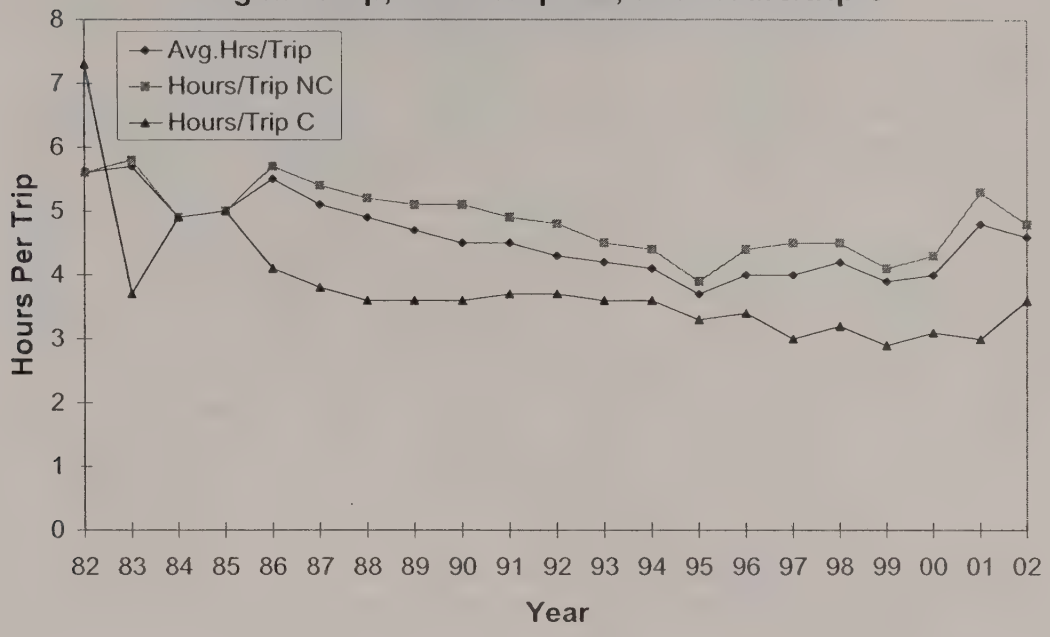
Interpretations: Trolling hours for non-charters and charters have generally increased over the past 20 years. From 1996, charter troll hours dropped due to a decrease in charter trolling activity, which also added to the decrease in total troll hours. For 2002, non-charter troll hours dropped 29% and charter troll hours dropped 30%. Non-charters accounted for 87% of total troll hours, while charters accounted for 13%. The decreases may be the result of bad weather days.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated boat hours spent fishing for the trolling method as taken directly from creel survey expansion system printouts.

Year	Troll hours	Troll hours NC	Troll hours C
82	28,857	28,419	438
83	29,555	29,009	546
84	28,256	26,528	1,727
85	35,895	32,593	3,302
86	36,997	33,940	3,057
87	33,187	29,605	3,582
88	56,224	48,398	7,826
89	48,226	39,063	9,163
90	46,021	32,096	13,925
91	44,151	31,016	13,135
92	43,855	27,070	16,785
93	43,131	31,274	11,857
94	45,931	32,829	13,102
95	57,626	39,284	18,342
96	64,603	44,916	19,687
97	56,994	42,856	14,137
98	59,645	48,453	11,192
99	54,991	45,685	9,305
00	53,066	43,731	9,335
01	57,825	50,489	7,336
02	41,040	35,876	5,164
Average	46,004	36,816	9,188
Standard Deviation	10,033	7,778	5,800

Figure 7c. Guam annual estimated trip length: Avg.hrs./trip, Hours/trip NC, and Hours/trip C



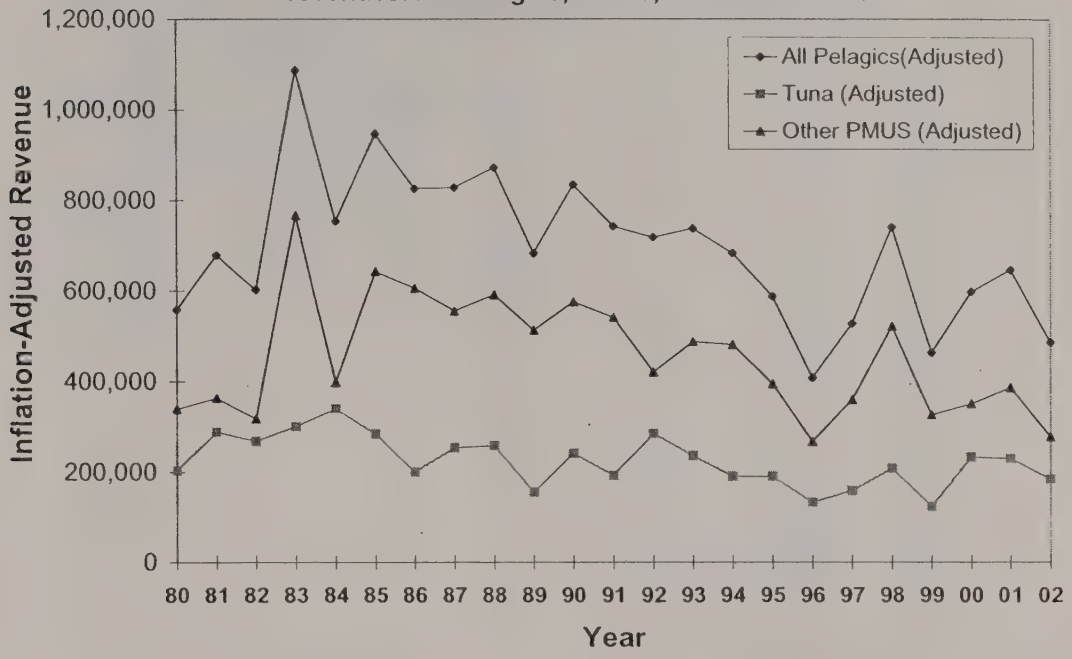
Interpretations: In 2002, the average hours per trip for non-charters dropped by 9%. However, the average number of hours per trip for charters increased by 20%. The increase observed for charters may have been due to the number of Fish Aggregating Devices (FADs) missing from nearshore locations, forcing charter boats to travel greater distances in order to catch fish.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated boat hours spent fishing and number of trips for the trolling method, as taken directly from creel survey, expansion system printouts.

Year	Average Hours/trip	Hours/trip NC	Hours/trip C
82	5.6	5.6	7.3
83	5.7	5.8	3.7
84	4.9	4.9	4.9
85	5.0	5.0	5.0
86	5.5	5.7	4.1
87	5.1	5.4	3.8
88	4.9	5.2	3.6
89	4.7	5.1	3.6
90	4.5	5.1	3.6
91	4.5	4.9	3.7
92	4.3	4.8	3.7
93	4.2	4.5	3.6
94	4.1	4.4	3.6
95	3.7	3.9	3.3
96	4.0	4.4	3.4
97	4.0	4.5	3.0
98	4.2	4.5	3.2
99	3.9	4.1	2.9
00	4.0	4.3	3.1
01	4.8	5.3	3.0
02	4.6	4.8	3.6
Average	4.6	4.9	3.8
Standard Deviation	0.6	0.5	1.0

Figure 8. Guam annual estimated inflation-adjusted commercial revenues: All Pelagics, Tunas, and Other PMUS



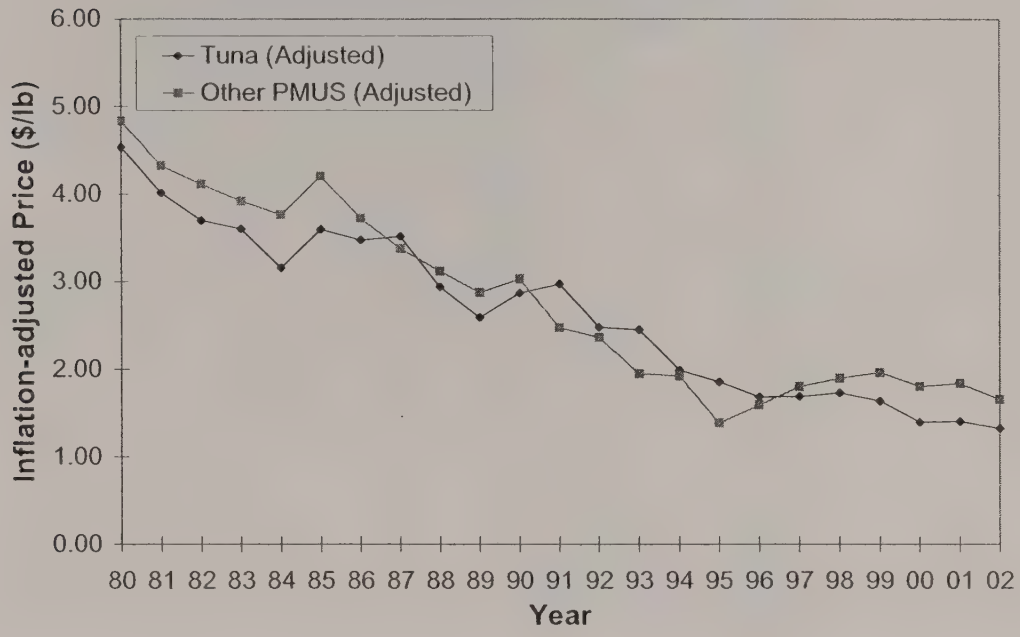
Interpretations: In 2002, estimated inflation-adjusted commercial revenues decreased for all pelagics (25%), for tunas (20%), and for other PMUS (28%).

Source: The WPACFIN-sponsored commercial landings system.

Calculation: Commercial revenues were estimated by summing the revenue fields in the commercial landings database from the principle fish wholesalers on Guam, and then multiplying by the same percent coverage expansion factor, as in figure 5. Inflation-adjusted total revenue per trip is derived from the Guam Annual Consumer Price Index (CPI).

			Revenues ($)			
	All Pelagics		Tunas		Other PMUS	
Year	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
1980	149,160	558,753	54,353	203,605	90,623	339,473
1981	218,384	679,175	92,914	288,964	117,052	364,033
1982	203,847	602,980	90,719	268,347	107,573	318,201
1983	380,231	1,087,079	105,308	301,076	268,201	766,786
1984	286,490	753,469	129,389	340,294	151,371	398,105
1985	373,796	946,450	112,286	284,307	253,815	642,659
1986	334,955	825,329	81,299	200,322	246,087	606,360
1987	350,828	827,954	107,642	254,035	235,603	556,022
1988	388,630	871,696	115,243	258,491	263,730	591,547
1989	337,586	682,936	76,865	155,499	253,932	513,704
1990	471,241	834,569	136,321	241,424	325,372	576,233
1991	462,191	742,278	119,640	192,142	337,328	541,748
1992	492,707	718,367	195,547	285,107	289,129	421,550
1993	547,835	737,386	175,360	236,035	362,728	488,231
1994	593,838	683,508	165,296	190,255	418,612	481,822
1995	537,889	587,913	173,629	189,777	361,363	394,970
1996	392,442	408,533	127,375	132,597	257,037	267,575
1997	514,882	527,754	154,819	158,689	351,180	359,959
1998	718,169	740,432	201,639	207,889	506,460	522,161
1999	458,638	464,141	122,023	123,488	323,088	326,965
2000	603,370	598,543	234,735	232,858	354,173	351,339
2001	643,219	646,435	228,652	229,795	385,135	387,061
2002	486,946	486,946	184,705	184,705	278,638	278,638
Average	432,490	696,201	138,511	224,335	284,271	456,311
Standard Deviation	144,083	160,914	49,071	56,081	101,480	129,941

Figure 9. Guam inflation-adjusted average price of Tunas and Other PMUS



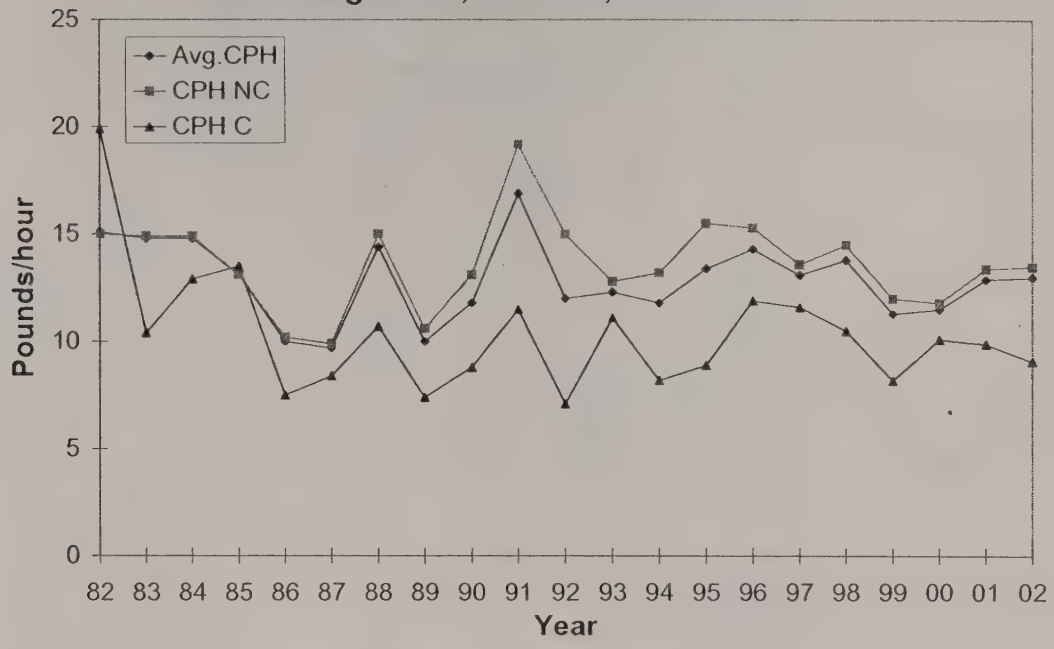
Interpretations: The inflation-adjusted price of tuna and other PMUS shows a general decline during the past 20 years. In 2002, the adjusted price for tuna and other PMUS decreased by 6% and 10%, respectively.

Source: The WPACFIN-sponsored commercial landings system.

Calculation: The average price of the Tunas and other PMUS groups are calculated by dividing the total revenue for each by the sold weight. The inflation adjustment is made by using the Consumer Price Index (CPI) for Guam and establishing the current year figure as the base from which to calculate expansion factors for all previous years (e.g., divide the current year CPI by the CPI of any given year), and then multiplying that factor by the unadjusted average price for the given year.

		Price/lb		
		Tuna		Other PMUS
Year	Unadj.	Adj.	Unadj.	Adj
1980	1.21	4.53	1.29	4.83
1981	1.29	4.01	1.39	4.32
1982	1.25	3.70	1.39	4.11
1983	1.26	3.60	1.37	3.92
1984	1.20	3.16	1.43	3.76
1985	1.42	3.60	1.66	4.20
1986	1.41	3.47	1.51	3.72
1987	1.49	3.52	1.43	3.37
1988	1.31	2.94	1.39	3.12
1989	1.28	2.59	1.42	2.87
1990	1.62	2.87	1.71	3.03
1991	1.85	2.97	1.54	2.47
1992	1.70	2.48	1.62	2.36
1993	1.82	2.45	1.45	1.95
1994	1.73	1.99	1.67	1.92
1995	1.70	1.86	1.27	1.39
1996	1.62	1.69	1.53	1.59
1997	1.65	1.69	1.76	1.80
1998	1.68	1.73	1.84	1.90
1999	1.62	1.64	1.94	1.96
2000	1.41	1.40	1.82	1.81
2001	1.40	1.41	1.83	1.84
2002	1.33	1.33	1.66	1.66
Average	1.49	**2.64**	1.56	**2.78**
Standard Deviation	0.21	**0.95**	0.19	**1.06**

Figure 10a. Guam trolling catch rates (lbs/hr): Average CPH, CPH NC, and CPH C



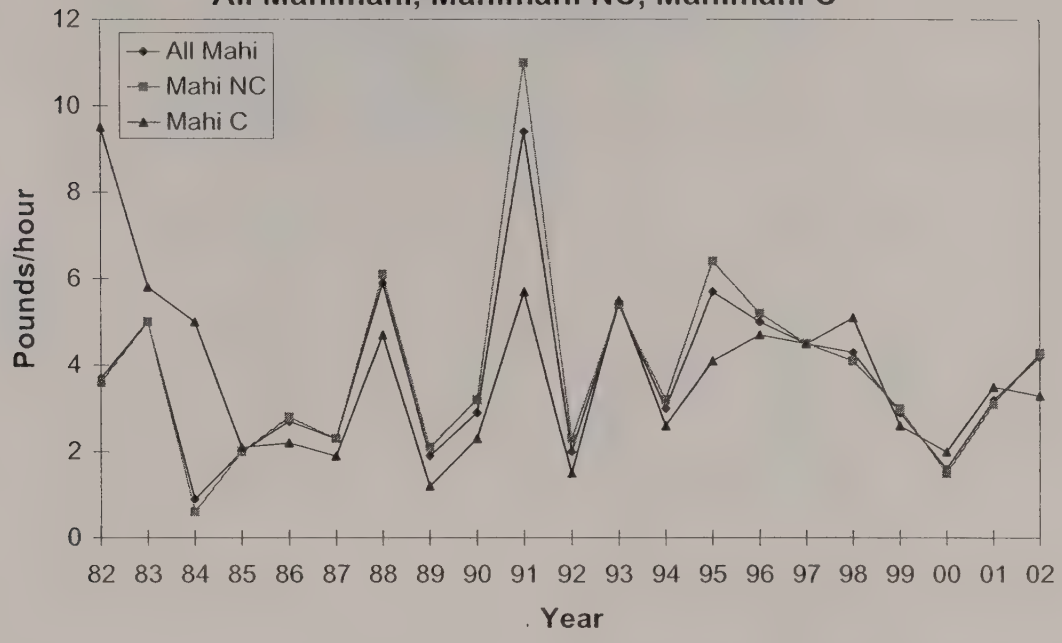
Interpretations: The fluctuations in CPUE are probably due to variability in the year-to-year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 2002, total catch rate increased by 0.8%, catch rate for non-charters increased by 0.7% and catch rate for charters decreased by 8%. In general, CPUE has been fairly stable for the past 20 years.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of all troll catch, divided by the total number of hours spent fishing (gear in use).

Year	Avg CPH	CPH NC	CPH C
82	15.1	15.0	19.9
83	14.8	14.9	10.4
84	14.8	14.9	12.9
85	13.1	13.1	13.5
86	10.0	10.2	7.5
87	9.7	9.9	8.4
88	14.4	15.0	10.7
89	10.0	10.6	7.4
90	11.8	13.1	8.8
91	16.9	19.2	11.5
92	12.0	15.0	7.1
93	12.3	12.8	11.1
94	11.8	13.2	8.2
95	13.4	15.5	8.9
96	14.3	15.3	11.9
97	13.1	13.6	11.6
98	13.8	14.5	10.5
99	11.3	12.0	8.2
00	11.5	11.8	10.1
01	12.9	13.4	9.9
02	13.0	13.5	9.1
Average	12.9	13.6	10.4
Standard Deviation	1.9	2.1	2.8

Figure 10b. Guam trolling catch rates: All Mahimahi, Mahimahi NC, Mahimahi C



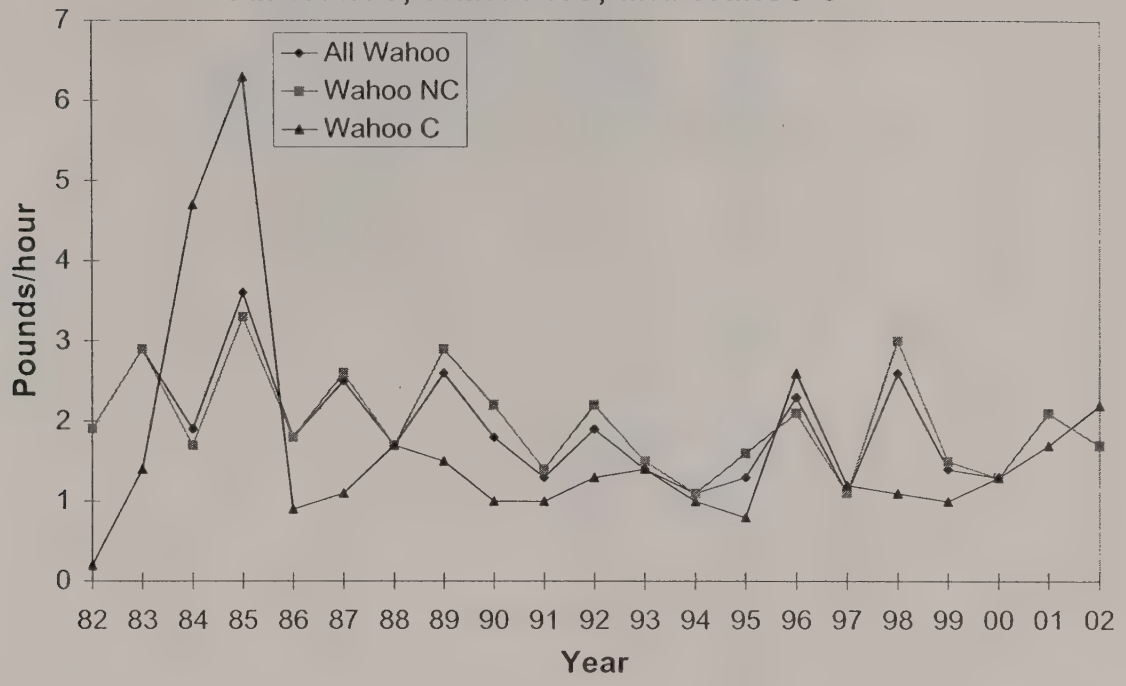
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year-to-year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 2002, the mahimahi catch rate increased 39% for non-charters and decreased 6% for charters.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of mahimahi divided by the total number of hours spent fishing (gear in use).

Year	All Mahimahi	Mahimahi NC	Mahimahi C
82	3.7	3.6	9.5
83	5.0	5.0	5.8
84	0.9	0.6	5.0
85	2.0	2.0	2.1
86	2.7	2.8	2.2
87	2.3	2.3	1.9
88	5.9	6.1	4.7
89	1.9	2.1	1.2
90	2.9	3.2	2.3
91	9.4	11.0	5.7
92	2.0	2.3	1.5
93	5.4	5.4	5.5
94	3.0	3.2	2.6
95	5.7	6.4	4.1
96	5.0	5.2	4.7
97	4.5	4.5	4.5
98	4.3	4.1	5.1
99	2.9	3.0	2.6
00	1.6	1.5	2.0
01	3.2	3.1	3.5
02	4.2	4.3	3.3
Average	3.7	3.9	3.8
Standard Deviation	1.9	2.2	2.0

Figure 10c. Guam trolling catch rates: All Wahoo, Wahoo NC, and Wahoo C



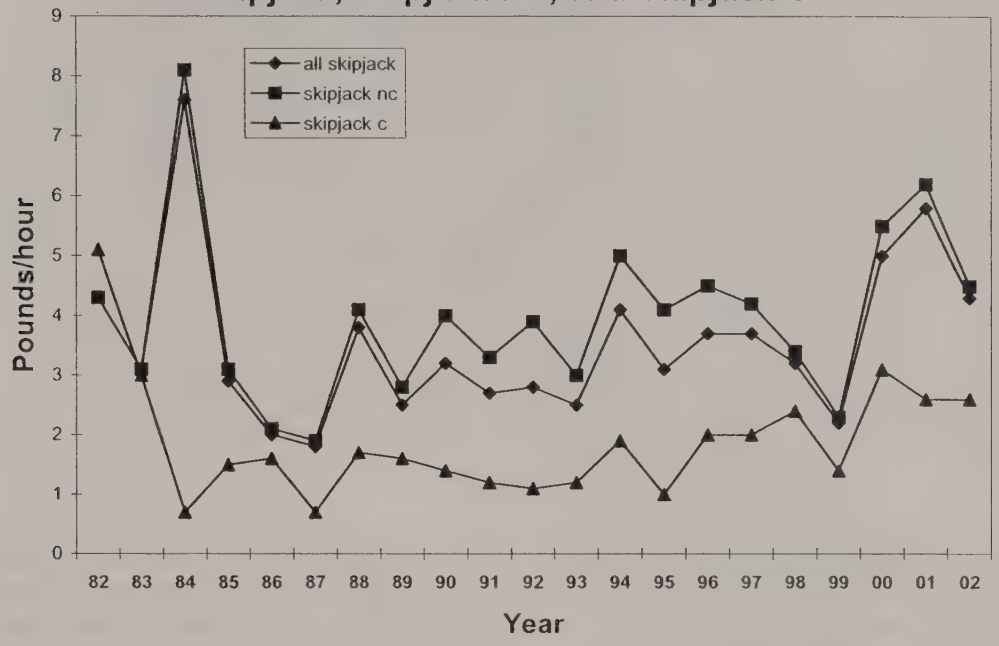
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year to year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 2002, the wahoo catch rate decreased 19% for non-charters and increased 29% for charters.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of Wahoo divided by the total number of hours spent fishing (gear in use).

Year	All Wahoo	Wahoo NC	Wahoo C
82	1.9	1.9	0.2
83	2.9	2.9	1.4
84	1.9	1.7	4.7
85	3.6	3.3	6.3
86	1.8	1.8	0.9
87	2.5	2.6	1.1
88	1.7	1.7	1.7
89	2.6	2.9	1.5
90	1.8	2.2	1.0
91	1.3	1.4	1.0
92	1.9	2.2	1.3
93	1.4	1.5	1.4
94	1.1	1.1	1.0
95	1.3	1.6	0.8
96	2.3	2.1	2.6
97	1.1	1.1	1.2
98	2.6	3.0	1.1
99	1.4	1.5	1.0
00	1.3	1.3	1.3
01	2.1	2.1	1.7
02	1.7	1.7	2.2
Average	1.9	2.0	1.7
Standard Deviation	0.6	0.6	1.4

Figure 11a. Guam trolling catch rates: All Skipjack, Skipjack NC, and Skipjack C



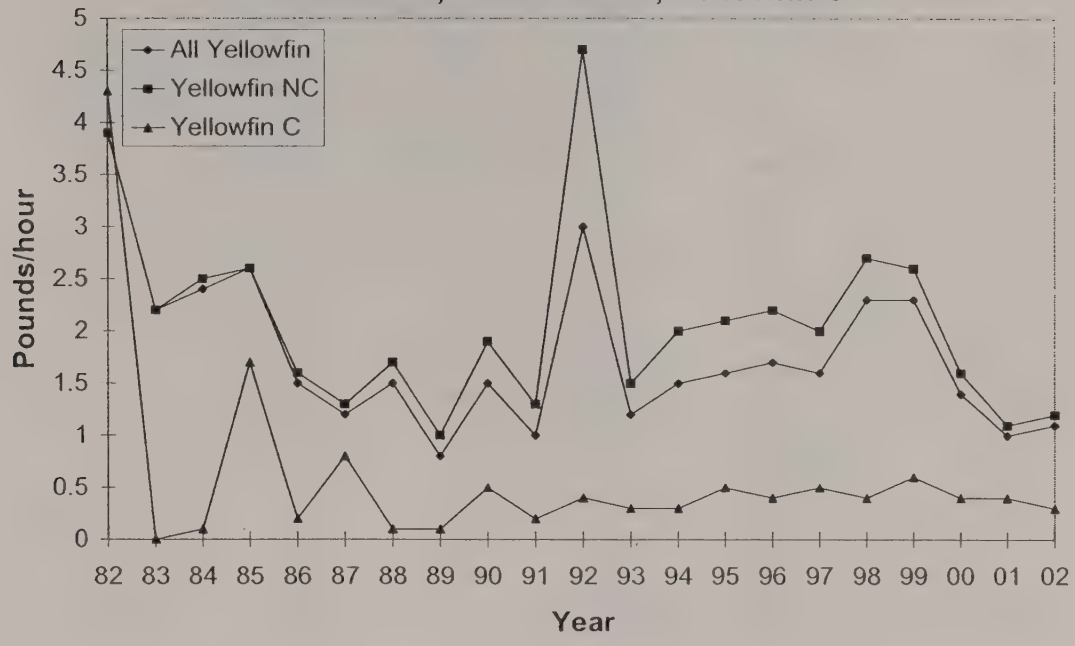
Interpretations: The wide fluctuations in CPUE for skipjack tunas are probably due to the high variability in the year-to-year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. In 2002, the skipjack catch rate decreased 27% for non-charters and remained constant for charters.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of skipjack divided by the total number of hours spent fishing (gear in use).

Year	All Skipjack	Skipjack NC	Skipjack C
82	4.3	4.3	5.1
83	3.1	3.1	3.0
84	7.6	8.1	0.7
85	2.9	3.1	1.5
86	2.0	2.1	1.6
87	1.8	1.9	0.7
88	3.8	4.1	1.7
89	2.5	2.8	1.6
90	3.2	4.0	1.4
91	2.7	3.3	1.2
92	2.8	3.9	1.1
93	2.5	3.0	1.2
94	4.1	5.0	1.9
95	3.1	4.1	1.0
96	3.7	4.5	2.0
97	3.7	4.2	2.0
98	3.2	3.4	2.4
99	2.2	2.3	1.4
00	5.0	5.5	3.1
01	5.8	6.2	2.6
02	4.3	4.5	2.6
Average	3.5	4.0	1.9
Standard Deviation	1.4	1.4	1.0

Figure 11b. Guam trolling catch rates: All Yellowfin, Yellowfin NC, Yellowfin C



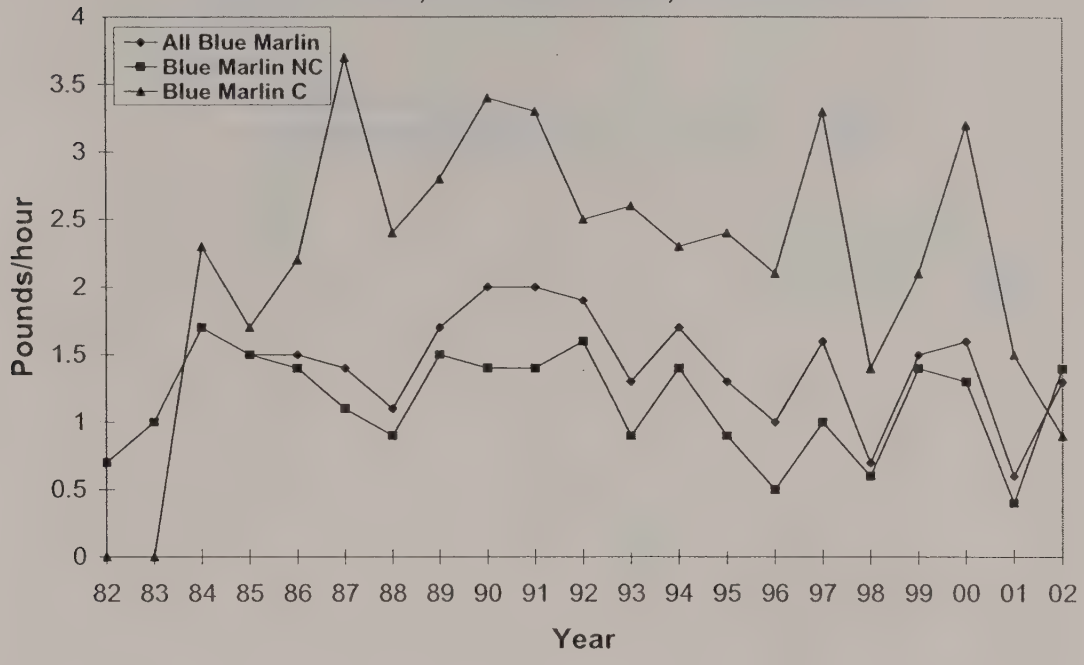
Interpretations: The wide fluctuations in CPUE for yellowfin tunas are probably due to the high variability in the year-to-year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. In 2002, the yellowfin catch rate increased 9% for non-charters and decreased 25% for charters.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of Yellowfin divided by the total number of hours spent fishing (gear in use).

Year	All Yellowfin	Yellowfin NC	Yellowfin C
82	3.9	3.9	4.3
83	2.2	2.2	0.0
84	2.4	2.5	0.1
85	2.6	2.6	1.7
86	1.5	1.6	0.2
87	1.2	1.3	0.8
88	1.5	1.7	0.1
89	0.8	1.0	0.1
90	1.5	1.9	0.5
91	1.0	1.3	0.2
92	3.0	4.7	0.4
93	1.2	1.5	0.3
94	1.5	2.0	0.3
95	1.6	2.1	0.5
96	1.7	2.2	0.4
97	1.6	2.0	0.5
98	2.3	2.7	0.4
99	2.3	2.6	0.6
00	1.4	1.6	0.4
01	1.0	1.1	0.4
02	1.1	1.2	0.3
Average	1.8	2.1	0.6
Standard Deviation	0.8	0.9	0.9

Figure 11c. Guam trolling catch rates: All Blue Marlin, Blue Marlin NC, and Blue Marlin C



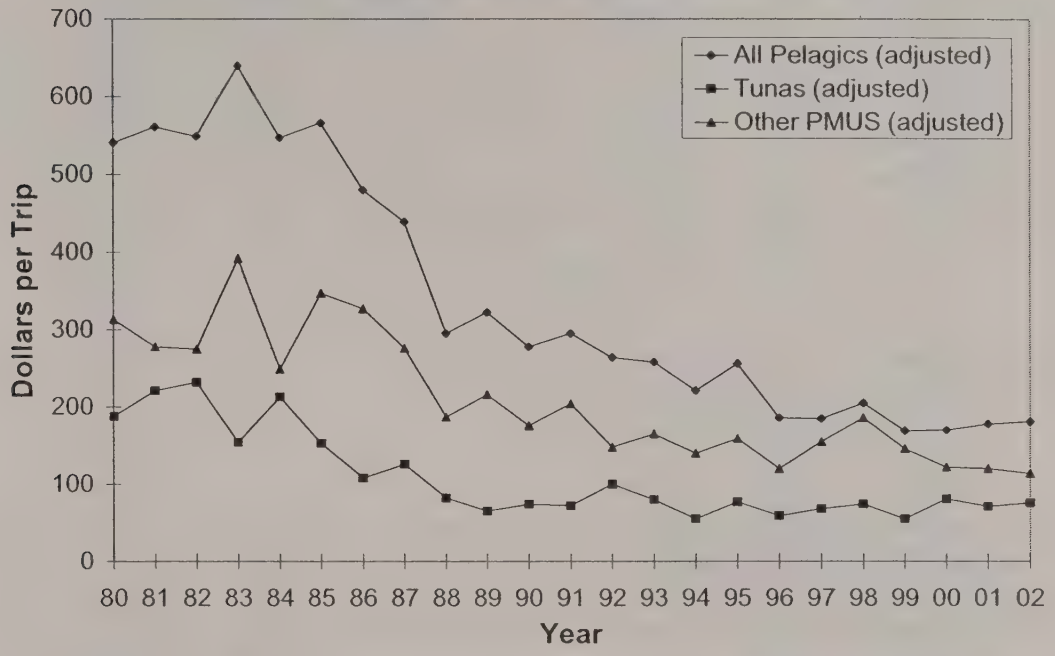
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year-to-year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. In 2002, the blue marlin catch rate increased 250% for non-charters and decreased 40% for charters.

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of marlin divided by the total number of hours spent fishing (gear in use).

Year	All Blue Marlin	Blue Marlin NC	Blue Marlin C
82	0.7	0.7	0.0
83	1.0	1.0	0.0
84	1.7	1.7	2.3
85	1.5	1.5	1.7
86	1.5	1.4	2.2
87	1.4	1.1	3.7
88	1.1	0.9	2.4
89	1.7	1.5	2.8
90	2.0	1.4	3.4
91	2.0	1.4	3.3
92	1.9	1.6	2.5
93	1.3	0.9	2.6
94	1.7	1.4	2.3
95	1.3	0.9	2.4
96	1.0	0.5	2.1
97	1.6	1.0	3.3
98	0.7	0.6	1.4
99	1.5	1.4	2.1
00	1.6	1.3	3.2
01	0.6	0.4	1.5
02	1.3	1.4	0.9
Average	1.4	1.1	2.2
Standard Deviation	0.4	0.4	1.0

Figure 12. Guam inflation-adjusted revenues per trolling trip: All Pelagics, Tunas, and Other PMUS



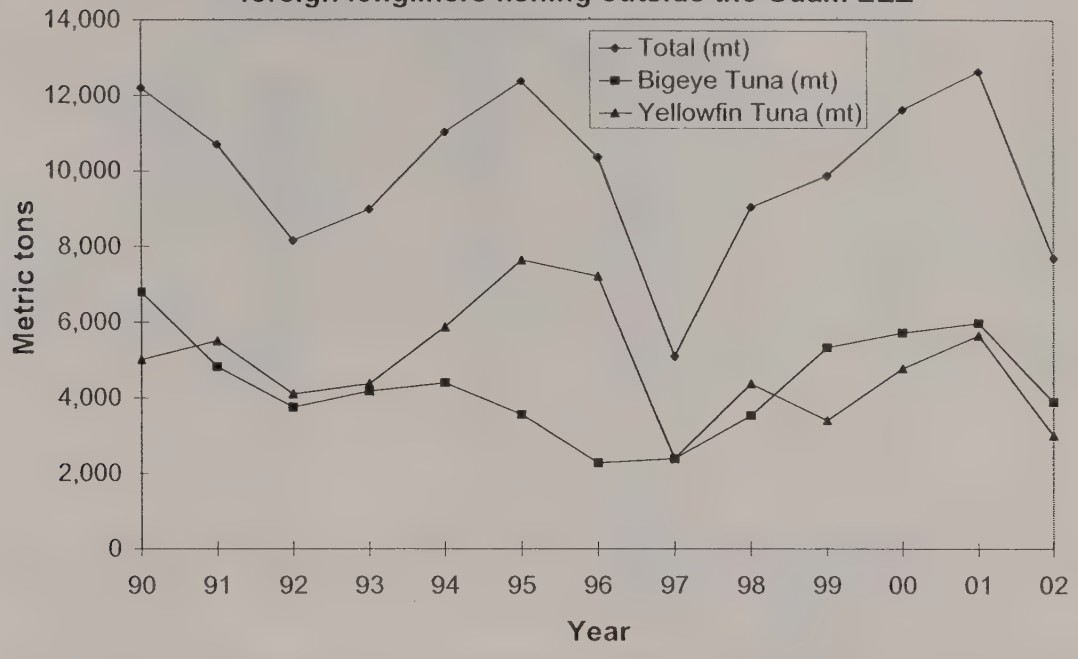
Interpretation: There has been a general decrease in the adjusted revenues per trolling trip for all pelagics, tunas and other PMUS from 1980 to 1996. In the past 6 years, the values have remained fairly constant. In 2002, the adjusted revenue per trip increased 2% for all pelagics, increased 7% for tunas, and decreased 5% for other PMUS. Despite fluctuations in revenues, effort still occurs since most charter and non-charter trolling boats do not rely on selling their fish for their primary source of income.

Source: The WPacFIN-sponsored commercial landings system.

Calculation: The average revenue per trip was calculated by summing the revenue of all species sold then dividing by the number of trips, and summing the revenue of tunas and other PMUS sold, and then dividing each by the number of trips, respectively, for any trip, which landed PMUS. Adjusted revenue per trip was derived from the Guam Annual Consumer Price Index (CPI).

		Revenues per trip ($)				
	All pelagics		Tunas		Other PMUS	
Year	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
1980	144	541	50	188	84	313
1981	181	561	71	221	89	278
1982	186	549	78	232	93	275
1983	224	640	54	154	137	392
1984	208	547	81	213	95	249
1985	223	566	61	153	137	347
1986	195	480	44	108	133	327
1987	186	439	53	126	117	276
1988	131	295	37	82	84	187
1989	159	322	32	65	107	216
1990	157	278	42	74	99	176
1991	183	295	45	72	127	204
1992	181	264	69	100	102	148
1993	192	258	59	80	122	165
1994	192	221	48	55	121	140
1995	234	256	70	77	146	159
1996	179	186	57	59	115	120
1997	199	185	58	68	131	155
1998	262	205	60	74	151	186
1999	273	169	45	55	118	146
2000	272	170	71	81	106	122
2001	242	178	65	71	109	120
2002	181	181	76	76	114	114
Average	184	339	60	108	119	209
Standard Deviation	24	160	14	57	24	82

Figure 13. Annual Guam longline landings from primarily foreign longliners fishing outside the Guam EEZ



Interpretation: Annual landings from a primarily foreign longline fishing fleet have ranged from a low of 5,093 metric tons in 1997 to a high of 12,627 metric tons in 2001. These vessels fish primarily outside Guam's EEZ, but transship their catch through Guam. In 2002, total longline landings decreased 39%, bigeye landings decreased 35%, and yellowfin landings decreased 47%, as compared to landings from 2001.

Source: The Guam Department of Commerce.

Calculation: Pre-1990 data was extracted directly from transshipment agents' files. Beginning in 1990, a mandatory data submission program was implemented.

Foreign Longline Landings

Year	Total	Bigeye tuna (metric tons)	Yellowfin tuna (metric tons)
	(Metric tons)		
90	12,198	6,793	5,011
91	10,707	4,824	5,505
92	8,157	3,754	4,104
93	8,981	4,178	4,379
94	11,023	4,400	5,867
95	12,366	3,560	7,635
96	10,356	2,280	7,214
97	5,093	2,395	2,392
98	9,032	3,533	4,379
99	9,865	5,328	3,404
00	11,618	5,718	4,778
01	12,627	5,977	5,650
02	7,697	3,904	3,014
Average	9,978	4,357	4,872
Standard Deviation	2,168	1,343	1,527

Table 4. Offshore Creel Survey Bycatch Number Summary - Trolling

		Number Released					Interviews		
Non-charter	Species	Alive	Dead/Inj	Both	All	BC %	With BC	All	BC %
	Carcharhinus melanopterus	1		1	1	100			
	Katsuwonus pelamis		1	1	1775	0.06			
	Thunnus albacares		1	1	251	0.4			
	Total	**1**	**2**	**3**	**2027**	**0.15**	**3**	**258**	**1.16**
	Compare with all Species				**3167**	**0.09**			
Charter									
	Compare with all Species				**276**	**0**			
	Total All Trolling	**1**	**2**	**3**	**2027**	**0.15**	**3**	**258**	**1.16**
	Compare with all Species				**3443**	**0.09**			

Interpretation: For 2002, the total estimated number of by-catch was 6 pieces or 0.15% of the total trolling catch. The by-catch consisted of three species: black tip shark (*Carcharinus melanopterus*), skipjack tuna (*Katsuwonus pelamis*), and Yellowfin tuna (*Thunnus albacares*).

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program.

Appendix 3

Hawaii

Introduction

Hawaii's pelagic fisheries, which include the longline, main Hawaiian Island (MHI) troll and handline, offshore handline, and the aku boat (pole and line) fisheries; are the state's largest and most valuable. The target species are tunas and billfish, but a variety of other species are also caught with some regularity. The longline, MHI troll and handline, and aku boat fisheries have a long history dating back to pre WWII days whereas the offshore handline fishery is relatively new. This fishery targets small bigeye and yellowfin tunas near seamounts and weather buoys around the Hawaiian Islands. Information on this fishery dates back to 1990. Collectively, these pelagic fisheries caught[1] an estimated 21 million pounds worth an estimated ex-vessel value of $44 million in 2002.

Hawaii's pelagic fisheries have been strongly affected by a series of legal decisions that resulted in state and federal regulatory measures since 2000, and the impact of their consequence continued into 2001 and 2002. The Hawaii-based longline fishery has operated since April 2001 under regulations designed to reduce interactions with sea turtles substantially. The two most significant regulations that affected the Hawaii-based longline fishery were the prohibition on shallow-set longline gear (swordfish-target longline gear) and the area closure south of 15°N from April 1 through May 31. A regulation setting a limit of 10 swordfish per trip was also implemented in response to vessels suspected of targeting swordfish. The gear and catch restrictions have eliminated the swordfish-target sector of the Hawaii-based longline fishery while the time-area closure reduced deep-set tuna-targeted longline effort in the vicinity of Kingman Reef and Palmyra Atoll. The state law passed in July 2000 and federal Shark Finning Prohibition Act signed into law in December 2000 dramatically reduced shark catches and revenue. Considerable research effort is being directed toward the interactions problem by National Marine Fisheries Service (NMFS) and the Western Pacific Regional Fishery Management Council (WPRFMC). Another amendment written by the WPRFMC outlines mandatory and optional mitigation measures to reduce seabird interactions with the longline fleet. Final action has not been taken on this amendment.

Total catch from Hawaii's pelagic fisheries grew from 13 million pounds in 1987 to 32 million pounds in 1993 and dropped to 25 million pounds the following year then rose to a record 36 million pounds in 1999. Since 2000, however, the catch decreased by 41% to 21 million pounds in 2002. Inflation-adjusted ex-vessel revenue for Hawaii's pelagic fisheries grew rapidly from $35 million in 1987 to a record $72 million in 1993 then dropped 20% in 1994. Revenue

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[1] This module reports "catch", as opposed to "landings" in most cases. Catch is that identified as *Pounds Caught* on HDAR commercial catch reports or the volume estimated from the longline logbook's number caught (x estimated round weight of fish kept). In some cases *Pounds Sold* are used in a market sense (i.e., number kept x estimated round weight).

remained relatively stable up through 1999 but then decreased sharply again in 2001 and remained about the same at $44 million in 2002.

The largest component of pelagic catch in Hawaii was tunas. The trend for tuna catches has been increasing and represented about 70% of the total pelagic catch in 2002. Bigeye tuna was the largest component of the tuna and has increased almost six-fold from its catch in 1987. Billfish catch dominated catch in the early 1990s making up about half of the total pelagic catch during that period but has declined to represent only 11% of the total catch in 2002. Swordfish was the largest component of the billfish catch from 1990 through 2000 and was replaced by blue marlin in the following two years. Other pelagic catch rose from 960 thousand pounds in 1988 to 3.8 million pounds in 1999 and remained at about 3 million pounds in the following three years. Mahimahi was the largest component of other pelagic catch though ono (wahoo) and moonfish catches have rose to comparable levels of mahimahi catch.

The longline catch was the largest of all pelagic fisheries in Hawaii and represented 80% of the total commercial pelagic catch in 2002. The number of active longline vessels decreased from 141 in 1991 to 103 in 1996 as vessels left for the U.S. mainland (primarily California) and Fiji. The number of vessels gradually increased to 125 vessels in 2000 with the return of the vessels that had migrated to the mainland and the arrival of new participants from the U.S. west coast and Alaska. Court-ordered regulations limiting swordfish-directed effort implemented in 2000 either forced vessels to convert and target tunas or leave Hawaii and fish elsewhere. The number of Hawaii-based longline vessels fell to 100 vessels in 2002. Many of the longline vessels that targeted swordfish now operate out of California. Twenty-one California-based longline vessels submitted federal High Seas longline logbook data in 2002. All but one fished out of Hawaii before 2000. Almost all of the vessels in the California-based longline fishery target swordfish.

The total number of longline trips out of Hawaii has remained relatively stable over the past ten years. However, there has been a significant change with a shift of longline effort from swordfish to tunas. The number of swordfish-directed trips has declined from 319 in 1993 to 0 in 2002. In contrast, tuna-directed effort has increased during this period, from 458 trips in 1992 to 1,162 trips in 2002.

Pelagic landings of the main Hawaiian Islands (MHI) troll and handline fisheries were relatively stable throughout the late 1980s to 2000, but decreased by 30% and 22% from 2001 to 2002. Catch by the aku boat fleet (pole-and-line for skipjack tuna) has been on a declining trend down to a historic low in 2002. The offshore handline fishery has grown into a fishery with catches that rivals and often exceeds catches of the established aku boat fishery.

Information & Sources

This report contains the most recently available information on Hawaii's commercial pelagic fisheries. Commercial fisheries reports are compiled from four data sources: The State of Hawaii's Division of Aquatic Resources (HDAR) commercial catch data, HDAR fish dealer data,

the National Marine Fisheries Service (NMFS) Honolulu Laboratory longline logbook data, and joint NMFS and HDAR marketing monitoring data.[2] Detailed data are not available for the because recreational fishers are not required to file catch reports (if they sell no fish during the year) and there is no comprehensive creel survey of Hawaii anglers. Several recent JIMAR research reports describe aspects of the relationship between commercial and recreational pelagic fishing, but accurate estimates of total recreational participation and catch remain absent.[3] The NMFS Marine Recreational Fisheries Statistical Survey has reinitiated operations in Hawaii after a 20 year absence with the first full year of fielding expected in 2002. The combined telephone-creel intercept survey is being conducted in collaboration with the HDAR. In the interim, a summary of what is known about recreational fisheries, including preliminary estimates of recreational catch, are included in Appendix 6.

The Council's annual report module for Hawaii was prepared using final 2001 and 2002 NMFS data tabulations and preliminary 2002 HDAR data. Final HDAR commercial catch reports for 2002, which include the troll, handline, pole-and-line, and other gears data, were not available when the bulk of this report was prepared. These data will be updated in the next annual report. Finally, total catch and CPUE analyses do not necessarily equal overall catch tables by fishery and species presented in this report due to compilations based on separate versions of the HDAR data sets.

This module was prepared by Russell Ito of NMFS, Andrew Burrell of HDAR, and Walter Ikehara of HDAR. Information from NMFS longline logbooks was provided by Frederick Dowdell of NMFS. Information on HDAR Commercial Marine Licenses (CMLs) was provided by Reginald Kokubun, HDAR. HDAR commercial catch and fish dealer data used in the NMFS time-series were compiled by Craig Graham from UH, JIMAR. Critical review of the Hawaii module was done by Bill Walsh, PFRP/JIMAR.

Hawaii commercial marine license information[4]

Any fisherman who takes marine species for commercial purposes is required by the State of Hawaii to have a Commercial Marine License (CML) and submit a monthly catch report to HDAR. An exception to this rule is that only one person per vessel is required to submit a catch

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[2] Ito, Russell Y. and Machado, Walter A. 2001. Annual report of the Hawaii-based longline fishery for 2000. Southwest Fisheries Science Center administrative report H-01-07.

[3] Hamilton, Marcia S and Stephen W. Huffman, 1997. Cost-earnings study of Hawaii's small boat fishery, 1995-96. University of Hawaii SOEST 97-06/JIMAR 97-314. 102 p.
McConnell, Kenneth E. and Timothy C. Haab, 2001. Small boat fishing in Hawaii: choice and economic values. University of Hawaii SOEST 01-01, JIMAR 01-336, 62 p.

[4] Information provided by the Hawaii Division of Aquatic Resources (HDAR).

report. This person is usually, but not necessarily, the captain. Crew members do not ordinarily submit catch reports. HDAR asks fishermen to identify their primary fishing gear or method on the Commercial Marine License at time of licensing. This does not preclude fishermen from using other gears or methods.

A total of 3,195 fishermen were licensed in 2002, including 2,025 who indicated that their primary fishing method and gear were intended to catch pelagic fish. Most licenses that indicated pelagic fishing as their primary method were issued to trollers (72%) and longline fishermen (18%). The remainder were issued to ika shibi and palu ahi (handline) (8%) and aku boat fishers (2%). The total number of licenses issued and licenses indicating pelagic fishing decreased 6% and 5%, respectively, from 2001.

Primary fishing method	**Number of licenses required to report**	
	2001	**2002**
Trolling	1,449	1,451
Longline	465	367
Ika shibi & palu ahi	163	164
Aku boat (pole and line)	44	43
Total pelagic	2,121	2,025
Total all methods	3,401	3,195

2002 Plan Team Recommendations:

1. The Plan Team recommends that an investigation be conducted into the declining trend of yellowfin CPUE in the Hawaii commercial troll fishery, particularly in relation to recent Pacific-wide yellowfin stock assessments and the swordfish fishery closure. Is localized depletion of yellowfin occurring around the Hawaiian Islands.

2. The Plan team recommends that methods to determine the true catch composition of the offshore handline fishery. This might be accomplished from the landings at the United Fishing Agency auction data, for both the past and present.

3. The Plan Team recommends that an analysis be conducted of striped marlin CPUE in the Hawaii longline fishery. Is the decline of striped marlin CPUEs from the 1990s to the present an effect of the southerly shift of tuna-targeting fishing effort?

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Table 1. Hawaii commercial pelagic catch, revenue, and average price by species, 2001-2002.

Species	2001 Pounds caught (1000 lbs)	2001 Ex-vessel revenue ($1000)	2001 Average price ($/lb)	2002 Pounds caught (1000 lbs)	2002 Ex-vessel revenue ($1000)	2002 Average price ($/lb)
Tuna PMUS						
Albacore	3,229	$3,584	$1.11	1,522	$1,781	$1.17
Bigeye tuna	5,873	$19,675	$3.35	10,266	$27,513	$2.68
Bluefin tuna	2	$10	$5.00	2	$16	$8.22
Skipjack tuna	1,696	$1,900	$1.12	986	$1,252	$1.27
Yellowfin tuna	4,145	$9,492	$2.29	2,462	$5,589	$2.27
Tuna PMUS subtotal	**14,945**	**$34,660**	**$2.32**	**15,238**	**$36,151**	**$2.37**
Billfish PMUS						
Swordfish	500	$1,155	$2.31	461	$904	$1.96
Blue marlin	1,494	$1,061	$0.71	1,001	$1,171	$1.17
Striped marlin	873	$925	$1.06	558	$893	$1.60
Other marlins	352	$303	$0.86	371	$326	$0.88
Billfish PMUS subtotal	**3,219**	**$3,444**	**$1.07**	**2,391**	**$3,294**	**$1.38**
Other PMUS						
Mahimahi	1,191	$1,918	$1.61	1,164	$2,223	$1.91
Ono (wahoo)	922	$1,558	$1.69	620	$1,364	$2.20
Opah (moonfish)	756	$930	$1.23	915	$1,226	$1.34
Sharks (whole weight)	327	$131	$0.40	388	$163	$0.42
Other pelagics	395	$553	$1.40	676	$933	$1.38
Other PMUS subtotal	**3,591**	**$5,089**	**$1.42**	**3,763**	**$5,909**	**$1.57**
Total pelagics	**21,755**	**$43,194**	**$1.99**	**21,392**	**$45,354**	**$2.12**

Interpretation: The total commercial pelagic catch was 21.4 million pounds in 2002, down 2% (-400 thousand pounds) from 2001. Tunas represented 71% of the total catch. Bigeye tuna was the largest component representing about half the total catch. The bigeye catch was a record 10.3 million pounds, up 75% from 2001 as year as a result of high longline catches. Yellowfin tuna and albacore were the next largest components. Blue marlin was the largest component of the billfish catch, while mahimahi and opah were the largest components of the other PMUS category in 2002.

Total Hawaii commercial ex-vessel revenue was $45.4 million, up 5% (+$2.2 million) in 2002. Tunas contributed 80%; bigeye tuna alone accounted for 61% of the total revenue at a record $27.5 million. Yellowfin tuna was the next highest contributor to total revenue at $5.6 million.

Billfish revenue decreased slightly. Other pelagic catch was up 16%, with the highest revenue coming from mahimahi.

Most fish prices increased slightly or remained close to 2001 levels. The exception was the lower average price of bigeye tuna which was probably related to the record catch of this particular species. Generally, higher prices were reflective of a stable, if not slightly improving post-9/11 U.S. economy. Uncertainty of the war in Iraq near the end of the year and a struggling Japan economy may have been contributing factors to downward pressures to the Hawaii economy but low federal interest rates could have helped offset the depressing economic factors mentioned above.

Source and Calculations: Longline logbook data are collected and processed by NMFS while longline market data are summarized from market sample data collected jointly by HDAR and NMFS. HDAR also collects fish dealer data. Total catch for the longline fishery was estimated by multiplying the number of fish kept from the NMFS longline logbook summaries with average weights from the market sampling data in 2001. Estimated total ex-vessel revenue was calculated by multiplying the estimated total catch by the average price from the market sampling data. Average weights and prices were used from HDAR fish dealer reports in 2002. Catch, revenue, and prices for the troll, handline, and aku boat fisheries were produced from HDAR commercial catch reports and fish dealer reports. Some rounding errors may be apparent in the tables.

Table 2. Hawaii commercial pelagic catch, revenue, and average price by gear, 2001-2002.

	2001			2002		
Gear	Pounds caught (1000 lbs)	Ex-vessel revenue ($1000)	Average price ($/lb)	Pounds caught (1000 lbs)	Ex-vessel revenue ($1000)	Average price ($/lb)
Longline	15,550	$33,400	$2.15	17,160	$37,500	$2.19
MHI trolling	2,610	$3,880	$1.49	1,840	$2,950	$1.60
MHI handline	1,600	$2,760	$1.73	1,250	$2,090	$1.67
Offshore handline	1,010	$1,080	$1.07	620	$610	$0.98
Aku boat	990	$1,380	$1.39	530	$750	$1.42
Total	**21,760**	**$42,500**	**$1.95**	**21,400**	**$43,900**	**$2.05**

Interpretation: The longline fishery is the largest commercial fishery in Hawaii. Longline catch and revenue were 17.2 million pounds and $37.5 million, respectively. These represent increases of 1.6 million pounds and $4.5 million. Average prices for the longline fishery increased by $0.15 per pound in 2002.

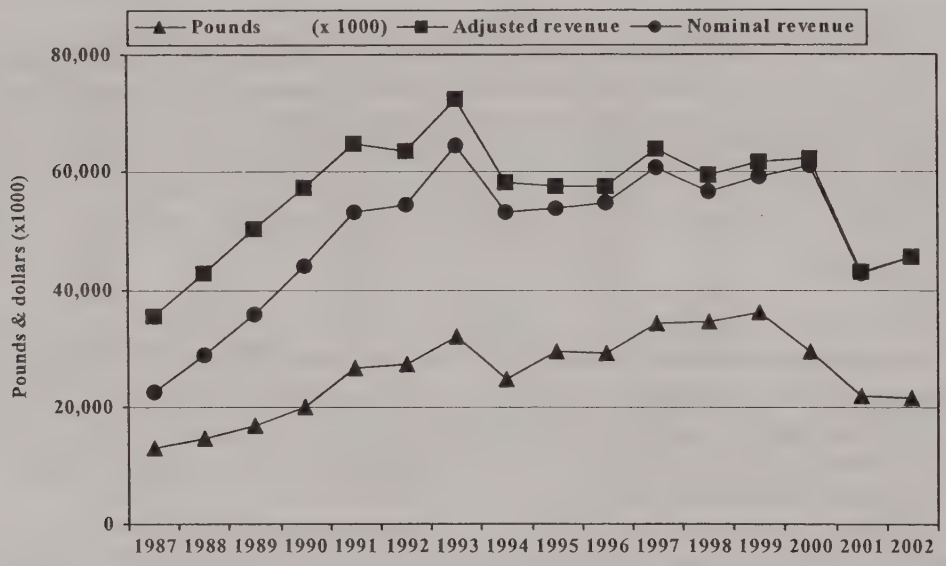
The Main Hawaiian Island troll fishery is the second largest commercial fishery. It produced 1.8 million pounds worth $3.0 million in 2002. Catch and revenue fell from 2001. Despite the increase in the average price of $0.11 per pound in 2002, the 30% decline in catch led to a 24% decline in ex-vessel revenue.

The Main Hawaiian Island handline fishery produced 1.3 million pounds of pelagic catch worth $2.1 million while the offshore handline fishery total catch was 620 thousand pounds worth $600 thousand in 2002. Catch, revenue, and average price for both these fisheries decreased in 2002.

The aku boat fishery also experienced lower catches and revenue in 2002. This fishery caught a record low 530 thousand pounds of fish valued at $750 thousand in 2002. Average price for this fishery was almost the same as the previous year.

Source and Calculations: Longline logbook data is collected and processed by NMFS while longline market data is summarized from market sample data collected jointly by HDAR and NMFS. HDAR also collects fish dealer data. Total catch, revenue, and average price for the longline fishery were produced by the number of fish kept from the NMFS longline logbook summaries with average weights and prices from the market sampling data in 2001. Average weights and prices were used from HDAR fish dealer reports in 2002. Catch, revenue, and prices for the troll, handline, and aku boat fisheries were summarized from HDAR commercial catch reports and fish dealer reports. Some rounding errors may be apparent in the tables.

Figure 1. Hawaii total commercial catch and revenue, 1987-2002.

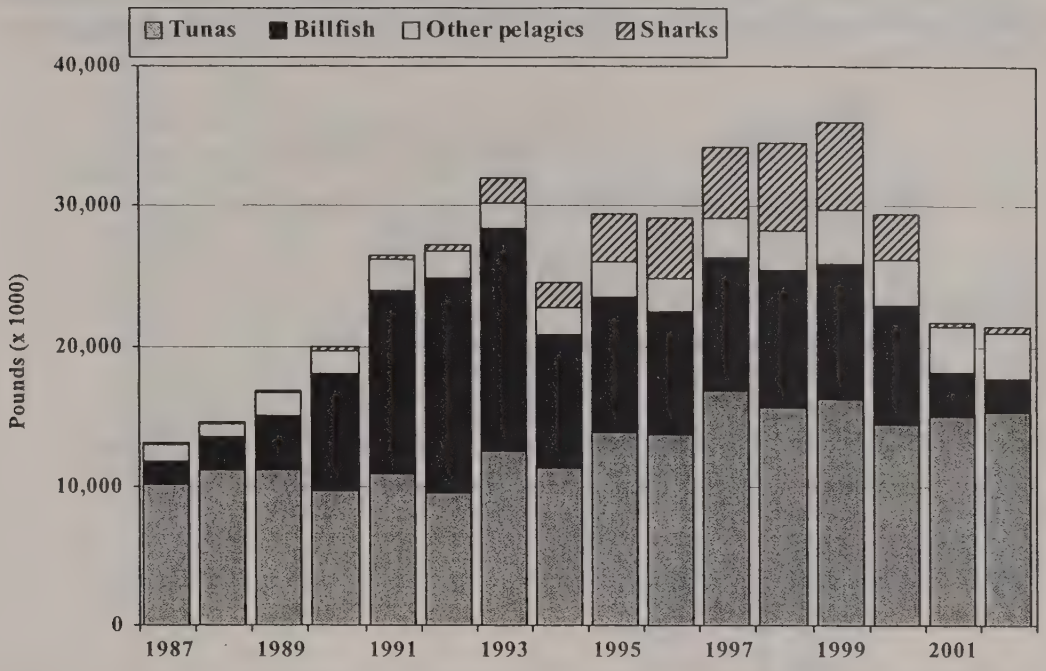


Interpretation: Pelagic catch and revenue grew from the late 1980s into the early 1990's Revenue peaked at $72 million in 1993 while catch peaked later at 36 million pounds in 1999. A steep decline for both catch and revenue was observed in 2001. Gear and species specific changes are explained in greater detail in following figures and tables.

Source and Calculations: Longline catches and revenue were calculated by combining NMFS logbook data and market sample data. Troll, handline, and aku boat catches and revenue were complied from HDAR commercial catch reports and fish dealer data. Catches from these fisheries were then grouped into PMUS categories.

Year	Pounds (x1000)	Nominal revenue ($1000)	Adjusted revenue ($1000)	Honolulu CPI
1987	13,020	22,490	35,290	114.9
1988	14,570	28,750	42,590	121.7
1989	16,790	35,800	50,150	128.7
1990	19,880	43,850	57,250	138.1
1991	26,540	53,170	64,770	148.0
1992	27,170	54,540	63,400	155.1
1993	31,940	64,360	72,480	160.1
1994	24,570	53,210	58,320	164.5
1995	29,420	53,750	57,650	168.1
1996	29,130	54,550	57,620	170.7
1997	34,160	60,840	63,810	171.9
1998	34,440	56,660	59,570	171.5
1999	35,970	59,130	61,520	173.3
2000	29,490	61,050	62,440	176.3
2001	21,760	42,660	43,110	178.4
2002	21,400	45,440	45,440	180.3
Average	25,640.6	49,390.6	55,963.1	
SD	7,157.1	12,016.1	9,939.3	

Figure 2. Hawaii commercial tuna, billfish, shark, and other pelagic PMUS catches, 1987-2002.



Interpretation: Pelagic catch grew from the late 1980s to a peak at 36 million pounds in 1999. Catches have since declined due to lower billfish and shark catches. Tunas catches have grown gradually from 1987-2002. They are now the largest PMUS group, comprising 71% of the total catch, at 15 million pounds in 2002. Much of this increase results from increased catches by the longline fishery.

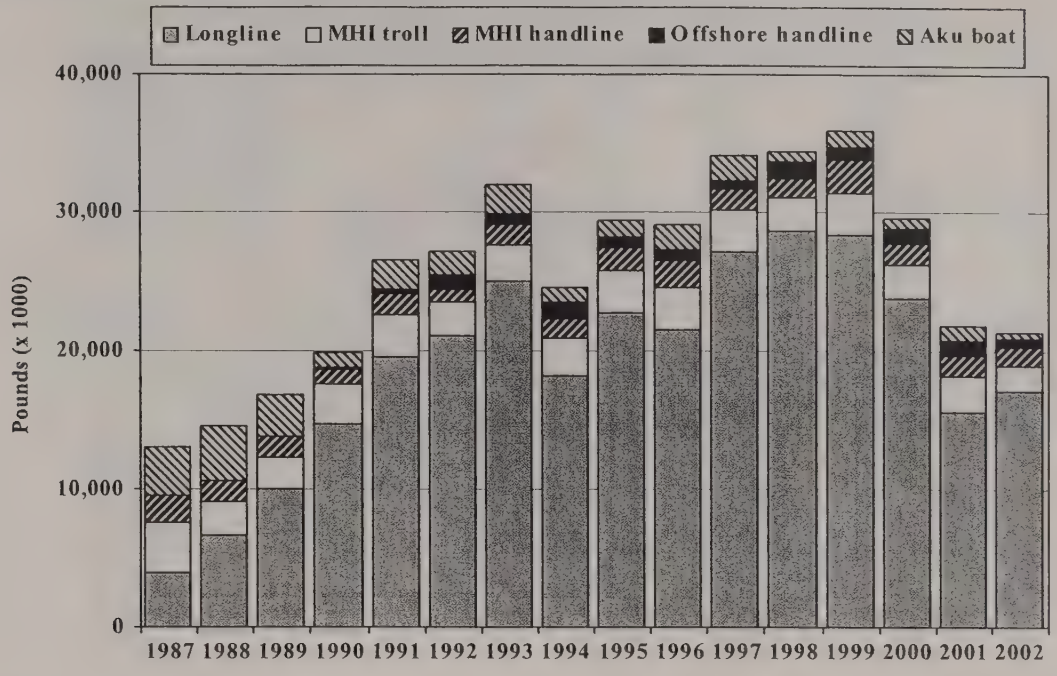
Billfish catches rose rapidly in the early 1990s due to increased longline catches of swordfish. Billfish catches dropped in 1994 and remained fairly constant up thereafter then dropped dramatically in 2000 due to regulations prohibiting targeting swordfish to reduce interactions with longline gear and sea turtles. Billfish catches were relatively low in 2001 and 2002. Other pelagic PMUS included mahimahi, ono (wahoo), moonfish, pomfrets and other miscellaneous pelagic species. Catches from this category have tripled over the 15 year period to become the second largest PMUS group. However, other PMUS catches are still relatively small to total catch.

Shark catches grew in the mid-1990s and peaked in 1999 as a result of the increasing practice of finning sharks by the longline fishery. This practice was prohibited by State and Federal law in 2000. Sharks catches dropped after these regulations were implemented.

Source and Calculations: Longline catches were calculated by multiplying the total number of fish kept by species from the NMFS logbook summaries with corresponding average weights from the market sample data. Troll, handline, and aku boat catches were complied from HDAR commercial catch reports and fish dealer data. Catches from these fisheries were then grouped into PMUS categories.

	Hawaii pelagic catch (1000 pounds)				
Year	Tunas	Billfish	Other pelagics	Sharks	Total
1987	10,125	1,557	1,291	43	13,016
1988	11,197	2,301	967	94	14,559
1989	11,179	3,880	1,527	203	16,789
1990	9,725	8,279	1,652	222	19,878
1991	10,794	13,129	2,292	318	26,533
1992	9,461	15,354	1,930	410	27,155
1993	12,417	15,927	1,850	1,736	31,929
1994	11,307	9,526	1,972	1,761	24,566
1995	13,820	9,724	2,416	3,468	29,427
1996	13,685	8,797	2,338	4,327	29,147
1997	16,813	9,491	2,829	5,010	34,142
1998	15,555	9,924	2,757	6,212	34,448
1999	16,146	9,758	3,797	6,272	35,973
2000	14,460	8,482	3,247	3,297	29,486
2001	14,953	3,219	3,270	327	21,770
2002	15,242	2,391	3,379	388	21,400
Average	**12,929.9**	**8,233.7**	**2,344.6**	**2,130.5**	**25,638.8**
SD	**2,438.0**	**4,493.6**	**815.5**	**2,291.5**	**7,157.9**

Figure 3. Total commercial pelagic catch by gear type 1987-2002.

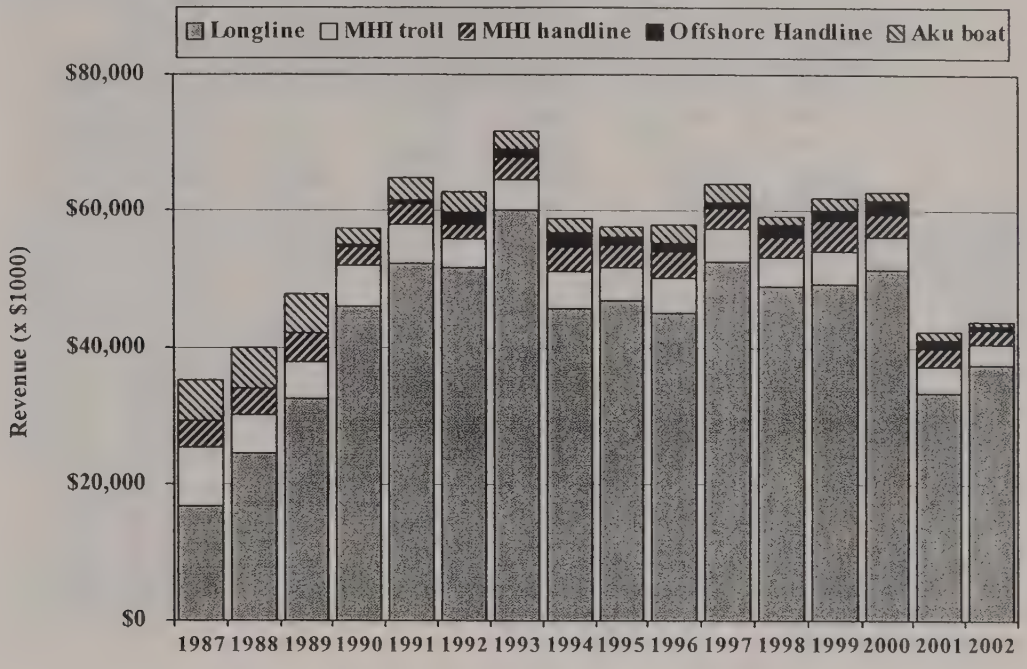


Interpretation: Hawaii commercial pelagic catch is dominated by longline catch. Longline catches rose in the late 1980s as the number of participants increased. Additional growth in the early 1990s was caused by growing swordfish catches and in the late 1990s the increasereflected the practice of finning sharks. Prohibitions on finning sharks and targeting swordfish into 2000 are the reasons for the recent decline in this fishery. Catches by the MHI troll and MHI handline fisheries are the next two largest fisheries in Hawaii. Catch from these fisheries have remained relatively constant since 1987. The offshore handline fishery grew in the early 1990s with catches leveling off thereafter. In contrast, aku boat catches have declined from the late 1980s due to attrition of a aging fleet.

Source and Calculations: Longline catches were calculated by multiplying the total number of fish kept by species from the NMFS logbook summaries with corresponding average weights from the market sample data. Troll, handline, and aku boat catches were complied from HDAR commercial catch reports and fish dealer data.

	Hawaii pelagic total catch (1000 pounds)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	3,890	3,710	1,920	-	3,500	13,020
1988	6,710	2,450	1,470	-	3,940	14,570
1989	9,940	2,400	1,490	-	2,960	16,790
1990	14,730	2,900	1,060	70	1,120	19,880
1991	19,480	3,100	1,480	330	2,150	26,540
1992	21,110	2,390	950	990	1,730	27,170
1993	25,010	2,580	1,530	680	2,140	31,940
1994	18,140	2,810	1,290	1,170	1,160	24,570
1995	22,720	2,970	1,730	710	1,290	29,420
1996	21,550	2,990	1,960	790	1,840	29,130
1997	27,150	3,020	1,480	560	1,950	34,160
1998	28,630	2,470	1,370	1,130	840	34,440
1999	28,350	3,010	2,410	890	1,310	35,970
2000	23,810	2,460	1,410	1,100	710	29,490
2001	15,550	2,610	1,600	1,010	990	21,760
2002	17,160	1,840	1,250	620	530	21,400
Average	**18,995.6**	**2,731.9**	**1,525.0**	**773.1**	**1,760.0**	**25,640.6**
SD	**7,423.2**	**423.7**	**355.8**	**326.7**	**993.6**	**7,157.1**

Figure 4. Total commercial pelagic ex-vessel revenue by gear type 1987-2002.

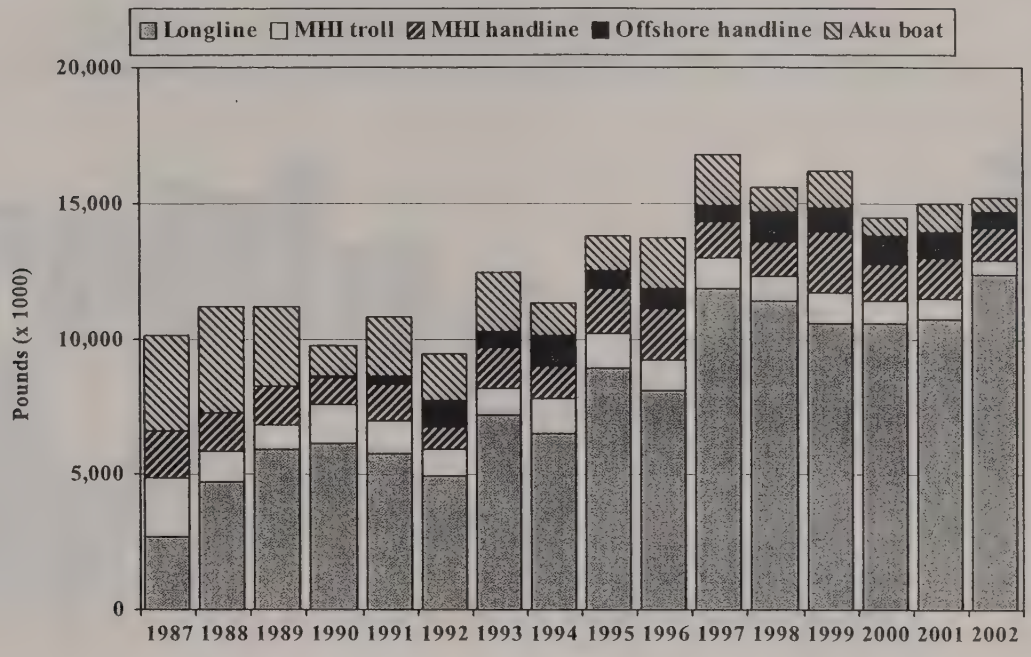


Interpretation: Ex-vessel revenue from Hawaii's pelagic fisheries was adjusted for inflation. Hawaii commercial pelagic catch is dominated by longline revenue. Longline revenue began to increase in the late 1980s as the fishery expanded. Longline revenue grew in the early 1990s due to growing swordfish catches peaking in 1993, dropping the next year, stabilizing up until restrictions and closure of the swordfish fishery in 2001. The MHI troll and MHI handline fisheries were ranked as the next two fisheries with the highest revenue. Revenue from these fisheries have remained relatively constant during the fifteen year period. The offshore handline fishery grew in the early 1990s with revenue leveling off thereafter. In contrast, aku boat revenue have declined from the late 1980s due fleet attrition and lower catches.

Source and Calculations: Longline revenue were calculated by multiplying the estimated total catch by the average price from the market sample data. Troll, handline, and aku boat revenue were summarized from HDAR commercial catch reports and fish dealer reports. Ex-vessel revenue was then adjusted for inflation using the Honolulu Consumer Price Index (HCPI).

	Hawaii pelagic total revenue ($1000)					
Year	Longline	MHI troll	MHI handline	Offshore Handline	Aku boat	Total
1987	$ 16,600	$ 8,690	$ 4,090	$ -	$ 5,890	$ 35,270
1988	$ 24,400	$ 5,740	$ 3,930	$ -	$ 6,020	$ 40,090
1989	$ 32,500	$ 5,460	$ 4,090	$ -	$ 5,810	$ 47,860
1990	$ 46,100	$ 5,870	$ 2,720	$ 130	$ 2,450	$ 57,270
1991	$ 52,300	$ 5,480	$ 3,080	$ 650	$ 3,300	$ 64,810
1992	$ 51,600	$ 4,370	$ 2,040	$ 1,720	$ 2,810	$ 62,540
1993	$ 60,100	$ 4,300	$ 3,290	$ 1,270	$ 2,720	$ 71,680
1994	$ 45,800	$ 5,370	$ 3,440	$ 2,130	$ 2,010	$ 58,750
1995	$ 46,800	$ 4,800	$ 3,370	$ 1,030	$ 1,660	$ 57,660
1996	$ 45,100	$ 4,910	$ 3,880	$ 1,380	$ 2,520	$ 57,790
1997	$ 52,500	$ 4,710	$ 3,190	$ 850	$ 2,510	$ 63,760
1998	$ 49,000	$ 4,220	$ 2,900	$ 1,780	$ 1,160	$ 59,060
1999	$ 49,300	$ 4,870	$ 4,470	$ 1,310	$ 1,740	$ 61,690
2000	$ 51,300	$ 4,780	$ 3,400	$ 1,990	$ 1,120	$ 62,590
2001	$ 33,400	$ 3,880	$ 2,760	$ 1,080	$ 1,380	$ 42,500
2002	$ 37,500	$ 2,950	$ 2,090	$ 610	$ 750	$ 43,900
Average	**$43,393.8**	**$ 5,025.0**	**$ 3,296.3**	**$ 1,225.4**	**$ 2,740.6**	**$55,451.3**
SD	**$11,538.6**	**$ 1,228.5**	**$ 696.9**	**$ 584.4**	**$ 1,717.4**	**$10,327.1**

Figure 5. Hawaii commercial tuna catch by gear type, 1987-2002.

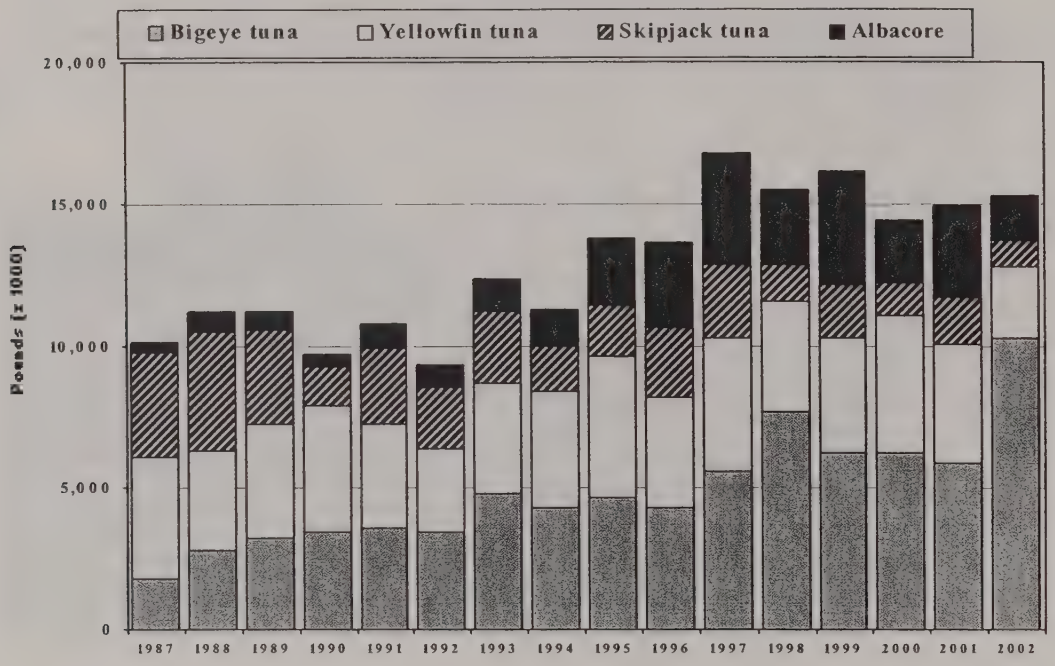


Interpretation: Longline gear has been the largest single contributor to Hawaii commercial tuna catch since1988, reaching 81% of the total in 2002. Tuna catches by the MHI troll fishery remained relatively unchanged but has seen a consistent decline since 1999. The MHI handline fishery was stable throughout the15 year period with a peak in 1999. Offshore handline tuna catches have grown since 1990 while the aku boat fishery experienced substantially lower catches in the 2000s compared to the late 1980s.

Source and Calculations: Longline tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii total tuna catch (1000 pounds)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	2,705	2,136	1,782	-	3,501	10,125
1988	4,725	1,141	1,395	-	3,936	11,197
1989	5,921	904	1,393	-	2,961	11,179
1990	6,162	1,401	981	66	1,116	9,725
1991	5,797	1,145	1,380	326	2,146	10,794
1992	4,908	980	885	967	1,721	9,461
1993	7,205	964	1,458	655	2,134	12,417
1994	6,540	1,239	1,213	1,157	1,158	11,307
1995	8,898	1,295	1,642	694	1,291	13,820
1996	8,074	1,146	1,845	776	1,844	13,685
1997	11,826	1,107	1,384	553	1,942	16,813
1998	11,359	933	1,298	1,121	845	15,555
1999	10,529	1,135	2,302	868	1,312	16,146
2000	10,534	845	1,324	1,050	707	14,460
2001	10,720	754	1,518	971	990	14,953
2002	12,365	554	1,187	606	530	15,242
Average	8,016.8	1,105.0	1,436.6	754.6	1,758.4	12,929.9
SD	2,939.8	347.4	341.6	319.2	993.0	2,438.0

Figure 6. Species composition of the tuna catch, 1987-2002.

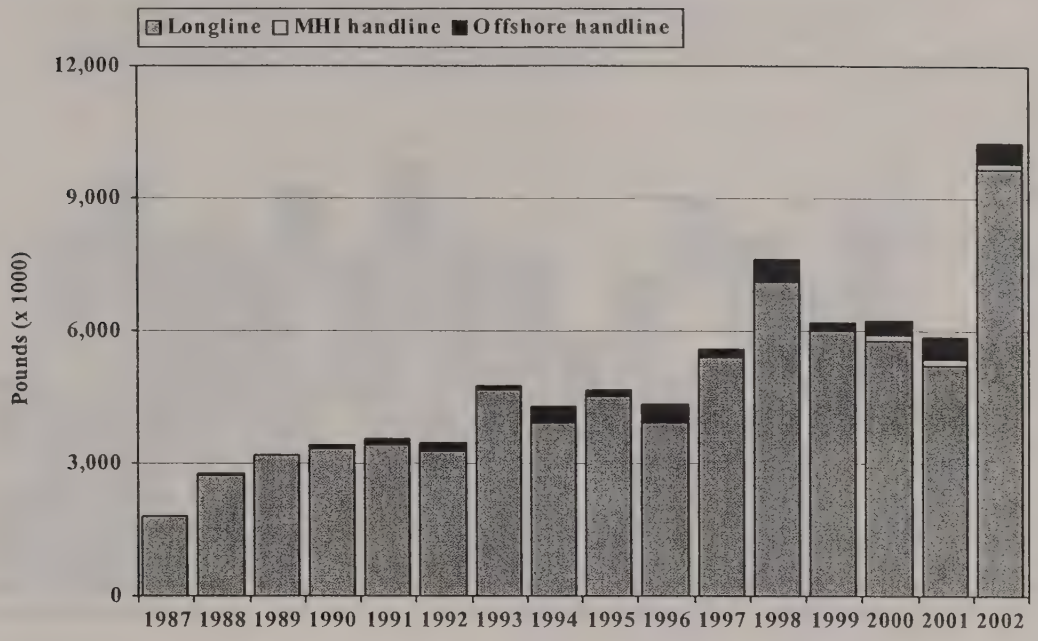


Interpretation: Bigeye tuna and albacore catches have increased due to the overall growth of the longline fishery, which began in the late 1980s, and the increase in tuna-directed fishing effort throughout the 1990s and 2000s. Bigeye tuna has been the largest component since 1996, a record catch in 2002. The MHI troll and handline (both MHI and offshore) fisheries accounted for most of the yellowfin tuna catch until 1999. The longline fishery has contributed most of the catch from 2000. Yellowfin tuna remained relatively unchanged throughout the time series. The aku boat (pole and line) fishery was the largest skipjack tuna fishery in Hawaii. Skipjack tuna catches were highest in the late 1980s and decreased slowly thereafter.

Source and Calculations: Longline tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii tuna catch (1000 pounds)				
Year	Bigeye tuna	Yellowfin tuna	Skipjack tuna	Albacore	Total
1987	1,814	4,310	3,633	345	10,125
1988	2,770	3,550	4,156	695	11,197
1989	3,208	4,020	3,298	626	11,179
1990	3,425	4,460	1,389	421	9,725
1991	3,572	3,663	2,690	846	10,794
1992	3,455	2,943	2,098	855	9,461
1993	4,768	3,871	2,546	1,122	12,417
1994	4,279	4,105	1,554	1,292	11,307
1995	4,667	4,941	1,814	2,327	13,820
1996	4,331	3,851	2,425	3,021	13,685
1997	5,596	4,628	2,608	3,920	16,813
1998	7,641	3,896	1,326	2,645	15,555
1999	6,212	4,012	1,909	3,979	16,146
2000	6,243	4,806	1,104	2,290	14,460
2001	5,873	4,145	1,696	3,229	14,953
2002	10,266	2,462	986	1,522	15,242
Average	4,882.4	3,979.0	2,202.0	1,820.9	12,929.9
SD	2,081.5	638.3	919.2	1,244.2	2,438.0

Figure 7. Hawaii bigeye tuna catch, 1987-2002.

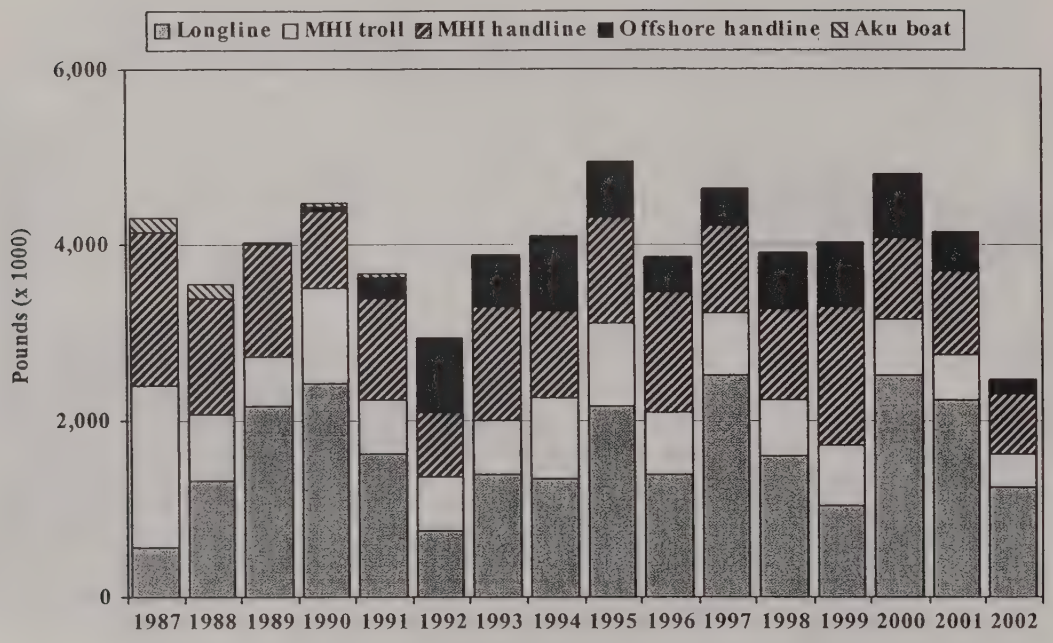


Interpretation: Annual bigeye tuna catches have increased more than five-fold from 1987-2002. The longline fishery typically produces more than 90% of the total bigeye tuna catch. Bigeye catch by this fishery was a record 9.7 million pounds in 2002. The offshore handline fishery grew to the second largest producer of bigeye tuna in Hawaii. MHI handline catches exceeded 100 thousand pounds for the first time in 2000. The MHI troll fishery had only small catches of bigeye tuna.

Source and Calculations: Longline bigeye tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline bigeye tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii bigeye tuna catch (1000 pounds)				
Year	Longline	MHI troll	MHI handline	Offshore handline	Total
1987	1,796	11	6	-	1,814
1988	2,732	10	28	-	2,770
1989	3,178	11	19	-	3,208
1990	3,338	15	41	31	3,425
1991	3,423	11	45	94	3,572
1992	3,277	9	19	151	3,455
1993	4,677	4	2	85	4,768
1994	3,940	6	10	324	4,279
1995	4,522	10	33	102	4,667
1996	3,940	4	11	375	4,331
1997	5,399	6	52	138	5,596
1998	7,113	5	15	508	7,641
1999	5,995	7	46	164	6,212
2000	5,788	6	133	317	6,243
2001	5,217	9	117	530	5,873
2002	9,669	14	131	452	10,266
Average	4,625.3	8.6	44.2	251.5	4,882.4

Figure 8. Hawaii yellowfin tuna catch, 1987-2002.

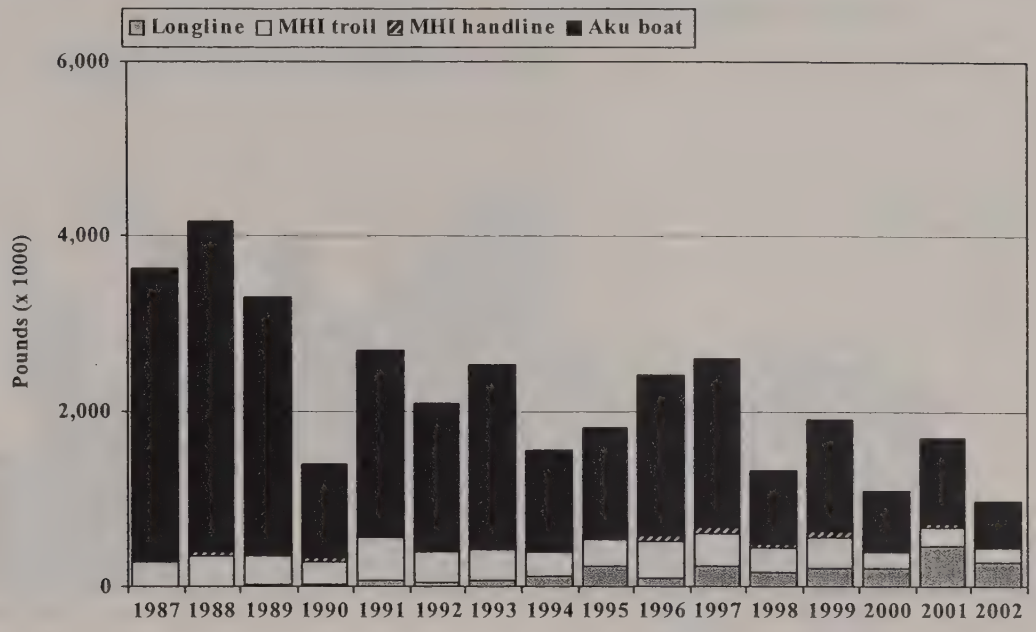


Interpretation: Yellowfin tuna catch varied substantially ranging from a record low 2.5 million pounds in 2002 up to 4.9 million pounds in 1995. The longline fishery had the highest yellowfin tuna catches from 1989. The MHI handline fishery usually was the second largest producer and was followed by MHI troll and offshore handline fisheries, respectively. The aku boat fishery (pole and line) had small catches of yellowfin tuna. This species is usually caught by the aku boat fishery when catches of skipjack tuna are poor.

Source and Calculations: Longline yellowfin tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat yellowfin tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii yellowfin tuna catch (1000 pounds)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	575	1,828	1,734	-	173	4,310
1988	1,309	764	1,310	-	168	3,550
1989	2,174	559	1,266	-	21	4,020
1990	2,421	1,089	876	35	39	4,460
1991	1,617	615	1,154	232	44	3,663
1992	763	606	722	816	36	2,943
1993	1,392	616	1,283	571	10	3,871
1994	1,336	914	1,003	834	19	4,105
1995	2,159	949	1,207	591	34	4,941
1996	1,389	707	1,352	401	2	3,851
1997	2,515	712	986	415	0	4,628
1998	1,592	636	1,052	613	3	3,896
1999	1,042	687	1,559	703	21	4,012
2000	2,506	649	916	734	2	4,806
2001	2,233	514	952	442	4	4,145
2002	1,257	375	676	153	1	2,462
Average	1,642.5	763.7	1,128.0	503.1	36.0	3,979.0
SD	620.1	332.8	287.0	251.8	54.5	638.3

Figure 9. Hawaii skipjack tuna catch, 1987-2002.

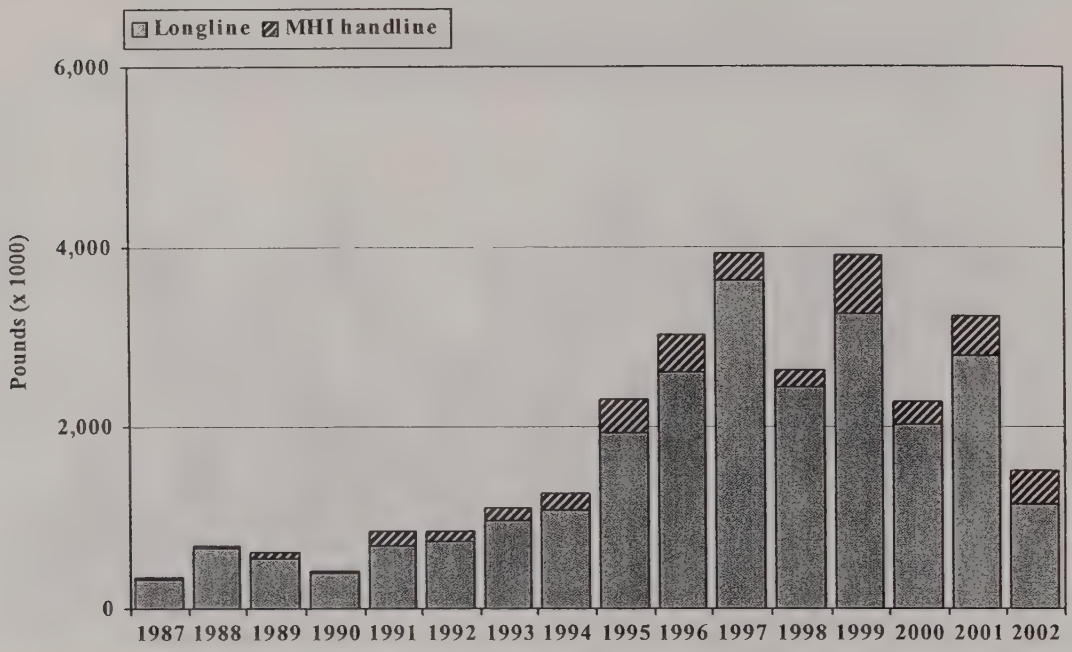


Interpretation: Skipjack tuna catch is dominated by the aku boat (pole and line) fishery. Though catches by this fishery have decreased, they still accounted for over half of the total skipjack tuna catch in 2002. The MHI troll fishery is typically the second largest contributor to skipjack tuna catch though longline skipjack tuna catches have grown over the past decade.

Source and Calculations: Longline skipjack tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat skipjack tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii skipjack tuna catch (1000 pounds)				
Year	Longline	MHI troll	MHI handline	Aku boat	Total
1987	3	277	25	3,328	3,633
1988	8	351	29	3,768	4,156
1989	22	318	20	2,938	3,298
1990	12	278	26	1,073	1,389
1991	66	504	19	2,102	2,690
1992	49	347	21	1,682	2,098
1993	79	332	14	2,121	2,546
1994	116	283	21	1,133	1,554
1995	223	318	17	1,256	1,814
1996	91	424	69	1,842	2,425
1997	234	376	56	1,942	2,608
1998	168	278	38	842	1,326
1999	219	347	52	1,291	1,909
2000	206	181	13	704	1,104
2001	466	216	28	986	1,696
2002	281	158	18	529	986
Average	140.2	311.7	29.0	1,721.1	2,202.0
SD	126.5	86.5	16.5	950.8	919.2

Figure 10. Hawaii albacore catch, 1987-2002.

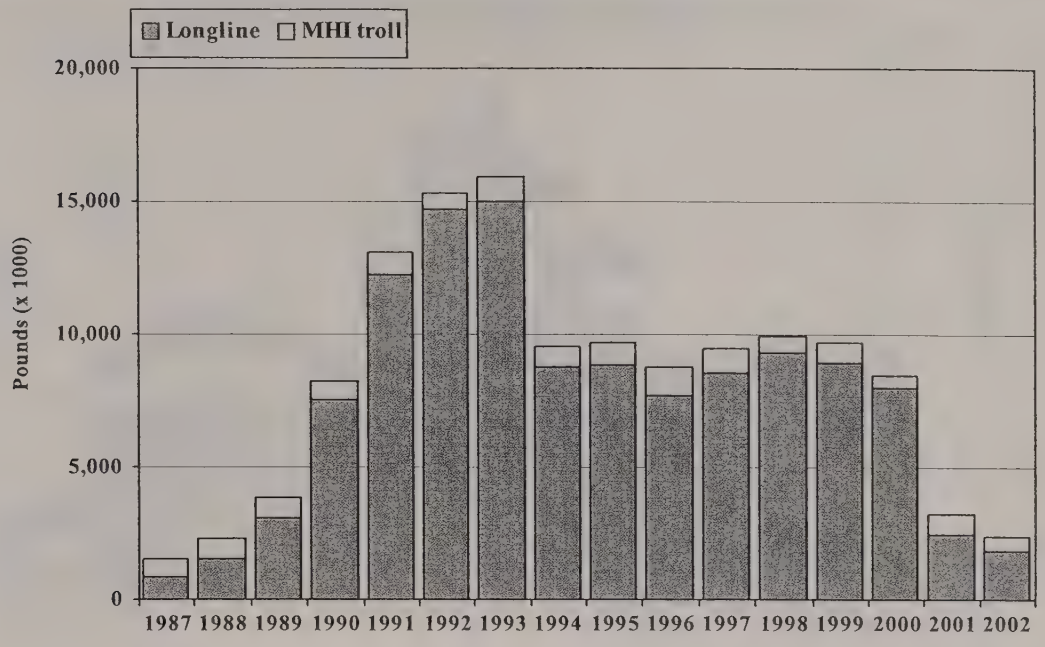


Interpretation: Albacore catch has increased by more than 12-fold from 1987 to 1999. Albacore catch showed substantial interannual variation thereafter. The longline fishery typically produces more than 80% of the albacore catch but fell to 76% in 2002. Albacore catch by the MHI handline fishery was relatively small but grew over the fifteen year period peaking at 640 thousand pounds in 1999. On rare occasions, the MHI troll fishery has encountered short "runs" of albacore but those catches were negligible in comparison.

Source and Calculations: Longline albacore catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline albacore catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii albacore catch (1000 pounds)			
Year	Longline	MHI troll	MHI handline	Total
1987	331	1	12	345
1988	676	1	18	695
1989	547	1	78	626
1990	390	1	31	421
1991	687	2	157	846
1992	735	3	116	855
1993	965	3	154	1,122
1994	1,095	22	176	1,292
1995	1,938	10	380	2,327
1996	2,606	5	409	3,021
1997	3,626	7	287	3,920
1998	2,450	4	191	2,645
1999	3,250	87	642	3,979
2000	2,026	4	260	2,290
2001	2,802	10	417	3,229
2002	1,156	5	361	1,522
Average	1,580.0	10.3	230.6	1,820.9
SD	1,088.4	21.1	176.0	1,244.2

Figure 11. Hawaii commercial billfish catch by gear type, 1987-2002.



Interpretation: Most of the billfish catch came from the longline fishery. High longline billfish catches between 1990 and 2000 consisted primarily of swordfish. Longline billfish catch rose 17-fold from 1987 to 1993 then decreased 42% in the following year. It increased steadily until 2000, but decreased 69% in 2001 and remained low in 2002. Billfish catches by the MHI troll fishery were relatively steady throughout the 15-year period with slightly higher catches in 1996 and 1997. The MHI handline fishery consistently had relatively low catches. Most of the billfish caught by this fishery was blue marlin.

Source and Calculations: Longline billfish catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline billfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii billfish catch (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	862	666	30	1,557
1988	1,537	736	29	2,301
1989	3,043	805	31	3,880
1990	7,519	732	28	8,279
1991	12,208	890	31	13,129
1992	14,656	683	15	15,354
1993	15,034	870	23	15,927
1994	8,737	770	19	9,526
1995	8,837	856	30	9,724
1996	7,723	1,042	32	8,797
1997	8,517	935	39	9,491
1998	9,277	626	21	9,924
1999	8,958	769	31	9,758
2000	7,970	489	24	8,482
2001	2,438	756	25	3,219
2002	1,883	491	17	2,391
Average	7,449.9	757.3	26.5	8,233.7
SD	4,447.2	148.5	6.3	4,493.6

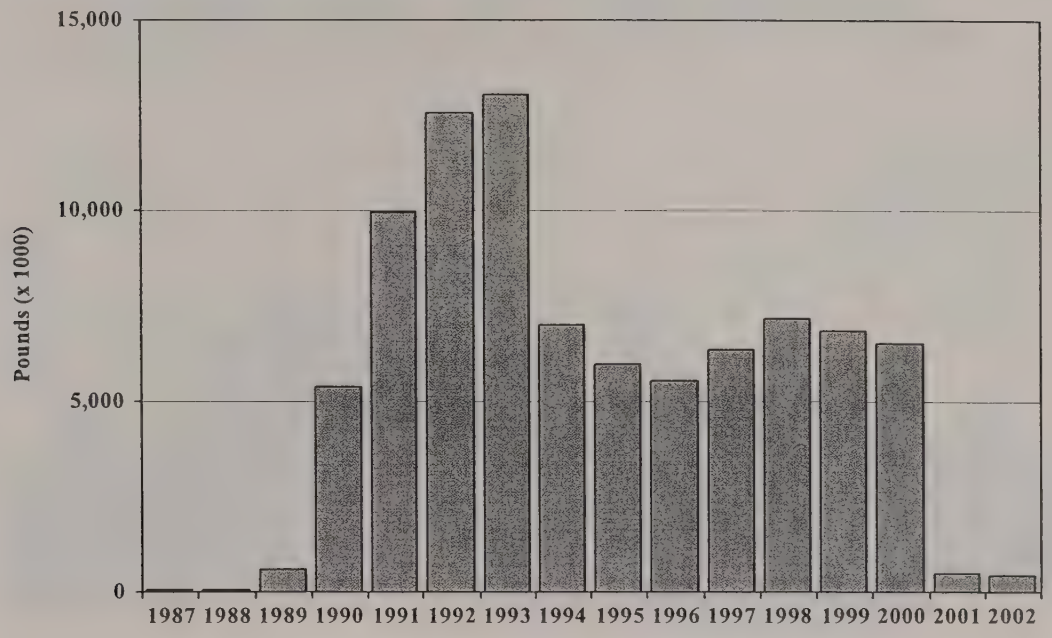
Figure 12. Species composition of the billfish catch, 1987-2002.

Interpretation: The billfish catch consisted mostly of marlins and small catches of swordfish from 1987 through 1989. In 1990 however, the composition changed and catch more than doubled as longline vessels began to target swordfish. Swordfish catches then increased dramatically and continued to dominate billfish catch until 2000. Swordfish catches dropped off dramatically in 2001 and remained low in 2002 due to regulatory actions. Billfish composition in 2001 and 2002 resembled the billfish composition of the late 1980s, with blue marlin as the largest component. Striped marlin catches were slightly higher in the late 1980s through the mid 1990s than in the last three years.

Source and Calculations: Longline billfish catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline billfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii billfish catch (1000 lbs)				
Year	Swordfish	Blue marlin	Striped marlin	Other marlins	Total
1987	60	686	667	144	1,557
1988	65	812	1,231	194	2,301
1989	635	1,502	1,403	340	3,880
1990	5,383	1,485	1,247	164	8,279
1991	9,953	1,418	1,551	208	13,129
1992	12,569	1,339	1,097	349	15,354
1993	13,036	1,434	1,191	266	15,927
1994	7,010	1,454	796	267	9,526
1995	5,994	1,952	1,313	464	9,724
1996	5,529	1,931	1,044	292	8,797
1997	6,368	1,908	861	354	9,491
1998	7,208	1,403	891	421	9,924
1999	6,856	1,432	866	605	9,758
2000	6,520	1,121	472	371	8,482
2001	500	1,494	873	352	3,219
2002	461	1,001	558	371	2,391
Average	5,509.2	1,398.2	1,003.9	322.4	8,233.7
SD	4,233.8	362.6	307.6	118.6	4,493.6

Figure 13. Hawaii swordfish catch, 1987-2002.

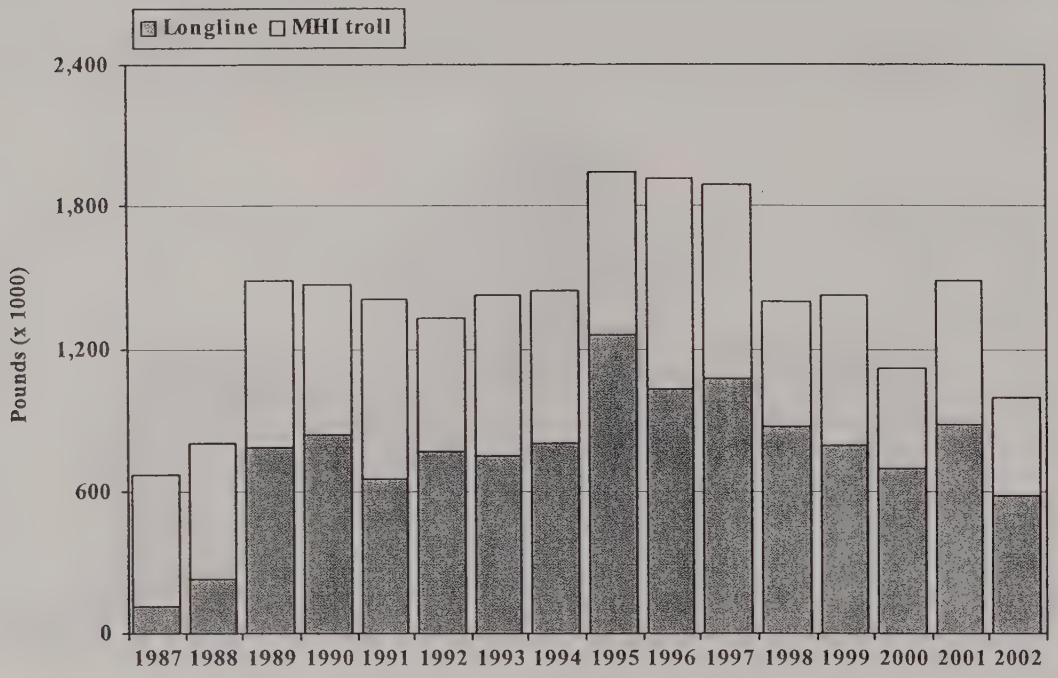


Interpretation: The trend in swordfish catches reflected both an expanding longline fishery in terms of vessel participation and increased targeting. Swordfish catches rose rapidly from 1988, peaked in 1993, and fell the following year. Catches remained relatively steady up to 2000 but dropped dramatically by 93% the following year and remained low in 2002 as a result of aforementioned regulations on shallow-set longline gear. Swordfish catch by the MHI handline fishery were low and probably caught on ika shibi handliners (night handline).

Source and Calculations: Longline swordfish catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline swordfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Swordfish catch (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	52	1	7	60
1988	52	2	11	65
1989	619	2	14	635
1990	5,372	1	10	5,383
1991	9,939	1	13	9,953
1992	12,566	0	3	12,569
1993	13,027	0	9	13,036
1994	7,002	1	7	7,010
1995	5,981	1	12	5,994
1996	5,517	1	11	5,529
1997	6,352	1	15	6,368
1998	7,193	1	14	7,208
1999	6,835	1	19	6,856
2000	6,502	1	16	6,520
2001	485	1	14	500
2002	450	1	10	461
Average	5,496.5	1.1	11.6	5,509.2
SD	4,234.9	0.5	3.9	4,233.8

Figure 14. Hawaii blue marlin catch, 1987-2002.

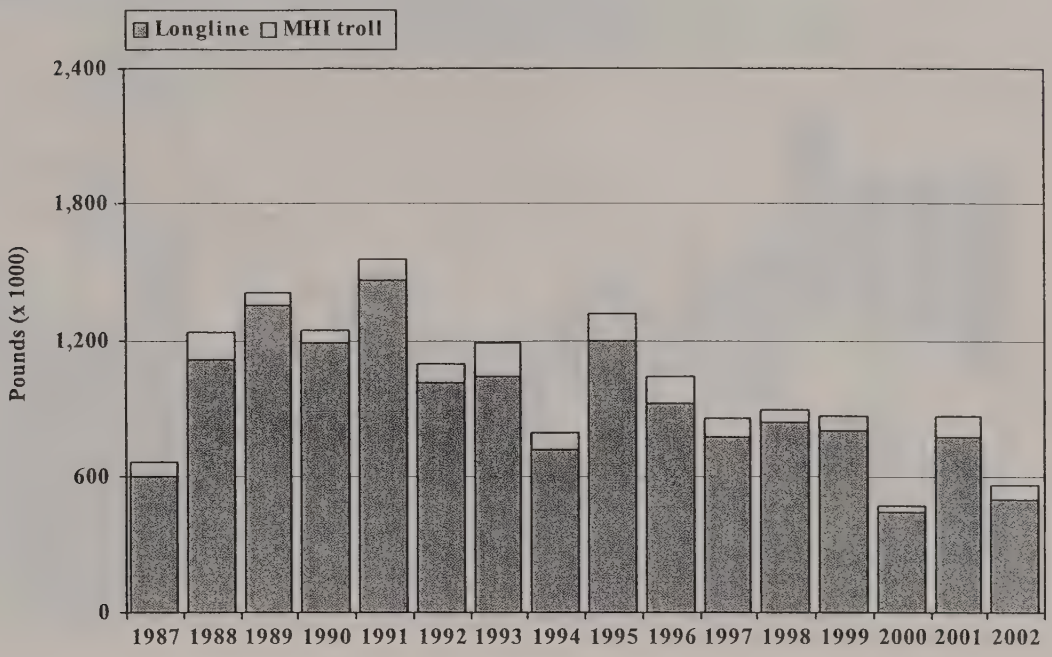


Interpretation: Total blue marlin catch rose from 1987, peaked in 1995, and has been on a declining trend into 2002. The MHI troll fishery had the largest catches early in the 15 year period but longline catches have consistently been the largest from 1992. Both fisheries had high blue marlin catches during 1989-90, 1995-97, and in 2001.

Source and Calculations: Longline blue marlin catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. These marlin catches by the longline fishery are nominal estimates which do not account for marlin ID problems. The latter is currently being studied in a Pelagic Fisheries Research Project (PFRP) project (see PFRP newsletter 7(10), 1-4). Troll and handline blue marlin catches were compiled from HDAR commercial catch reports and fish dealer data.

	Blue marlin catch (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	112	557	18	686
1988	225	575	12	812
1989	784	704	14	1,502
1990	834	638	12	1,485
1991	654	749	14	1,418
1992	765	565	9	1,339
1993	748	675	11	1,434
1994	798	648	8	1,454
1995	1,257	684	11	1,952
1996	1,030	885	16	1,931
1997	1,074	814	20	1,908
1998	870	527	6	1,403
1999	787	635	10	1,432
2000	692	423	5	1,121
2001	879	610	5	1,494
2002	582	412	6	1,001
Average	755.7	631.4	11.1	1,398.2
SD	283.6	126.0	4.5	362.6

Figure 15. Hawaii striped marlin catches, 1987-2002.

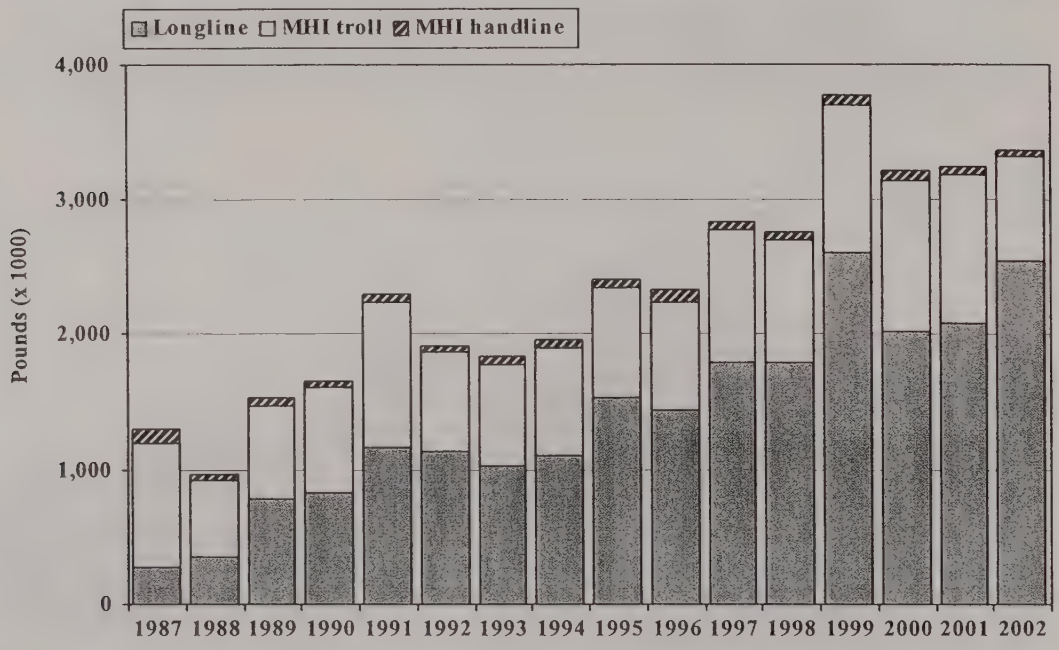


Interpretation: Total catch of striped marlin has been on a declining trend since the early 1990's. The longline fishery typically produces more than 90% of the total striped marlin catch. The MHI troll fishery was the second largest producer of striped marlin in Hawaii. There was no clear trend with catches of striped marlin by the MHI troll fishery.

Source and Calculations: Longline striped marlin catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. These marlin catches by the longline fishery are nominal estimates which do not account for marlin ID problems. The latter is currently being studied in a Pelagic Fisheries Research Project (PFRP) project (see PFRP newsletter 7(10), 1-4). Troll and handline striped marlin catches were compiled from HDAR commercial catch reports and fish dealer data.

	Striped marlin catch (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	599	66	2	667
1988	1,110	118	2	1,231
1989	1,350	52	1	1,403
1990	1,186	59	1	1,247
1991	1,462	89	1	1,551
1992	1,013	83	2	1,097
1993	1,039	150	2	1,191
1994	719	76	1	796
1995	1,198	114	1	1,313
1996	923	119	2	1,044
1997	775	83	3	861
1998	834	57	0	891
1999	803	62	1	866
2000	441	30	1	472
2001	775	94	5	873
2002	498	59	1	558
Average	920.3	82.0	1.5	1,003.9
SD	294.4	31.1	1.1	307.6

Figure 16. Hawaii commercial catch of other pelagic PMUS by gear type, 1987-2002.

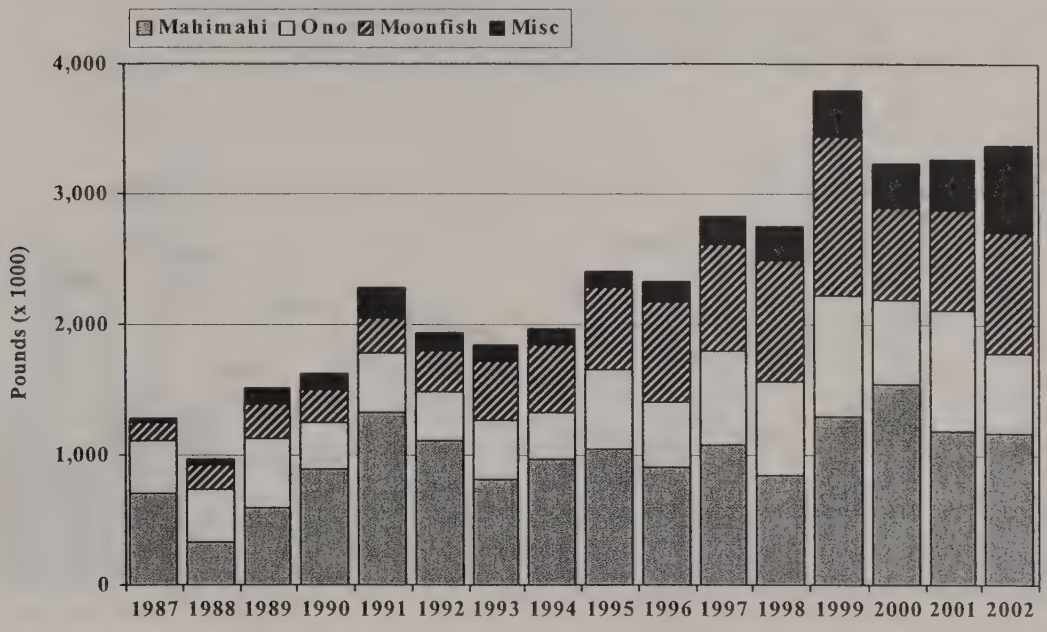


Interpretation: The total commercial catch of other pelagic PMUS showed a trend of increase over the 15-year period. The growth in catch was driven by increased longline catches which increased by 9 -fold when comparing catch in 1987 to catch in 2002. The MHI troll fishery was the second largest producer, with relatively stable catches though it exceeded 1.1 million pounds from 1999-2001. The MHI handline, offshore handline and aku boat fishery had relatively small catches of other pelagic PMUS.

Source and Calculations: Longline catches of other PMUS were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Catch of other pelagic PMUS by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Total other pelagic PMUS catch (1000 pounds)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	281	907	103	-	2	1,291
1988	354	569	44	-	4	967
1989	775	691	61	-	1	1,527
1990	829	768	55	0	0	1,652
1991	1,155	1,067	65	5	0	2,292
1992	1,131	731	47	21	14	1,930
1993	1,030	744	52	23	3	1,850
1994	1,100	800	54	18	0	1,972
1995	1,520	815	61	20	0	2,416
1996	1,429	806	86	17	0	2,338
1997	1,792	974	54	9	5	2,829
1998	1,781	912	51	13	0	2,757
1999	2,589	1,109	79	20	0	3,797
2000	2,012	1,122	67	46	0	3,247
2001	2,069	1,104	61	36	0	3,270
2002	2,527	792	45	15	0	3,379
Average	1,398.4	869.4	61.7	15.2	1.9	2,344.6
SD	694.8	166.3	16.0	13.2	3.6	815.5

Figure 17. Species composition of other PMUS catch, 1987-2002.

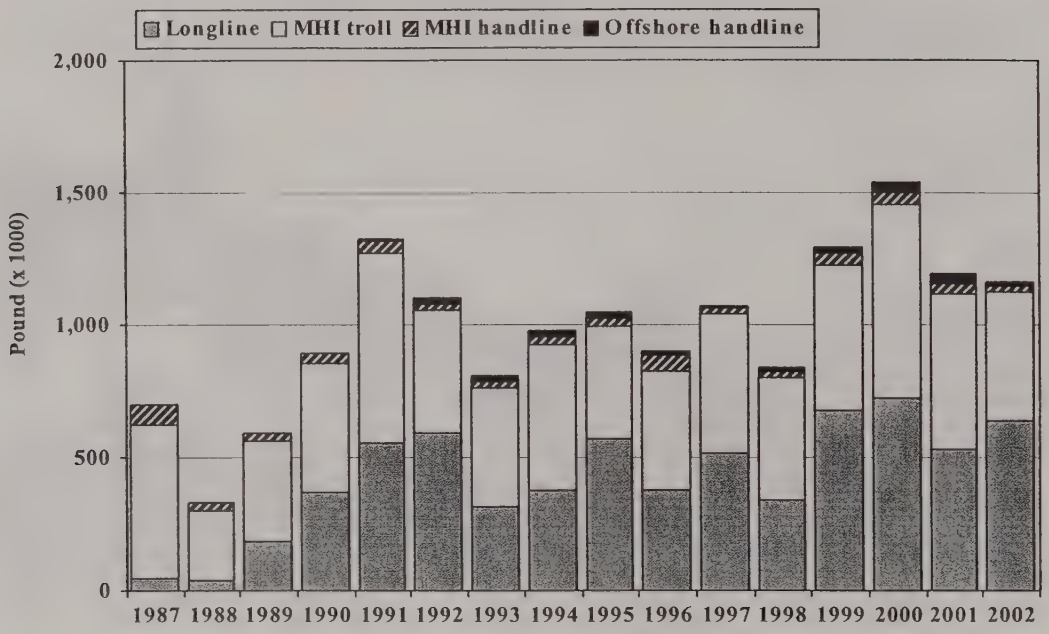


Interpretation: Mahimahi was usually the largest component of the other pelagic PMUS catch (30-60% of the annual total). Catches of this species from 1999 to 2002 were above average. However, the overall increase in catch was due largely to increased catches of moonfish and to a lesser extent, catches of ono. Miscellaneous pelagic species, primarily pomfret, have also an increase peaking in 2002.

Source and Calculations: Longline catches of other PMUS were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Catch of other pelagic PMUS by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Catch of other pelagic PMUS (1000 lbs)				
Year	Mahimahi	Ono	Moonfish	Misc	Total
1987	704	400	152	31	1,287
1988	332	406	182	43	963
1989	596	522	274	116	1,509
1990	894	352	253	130	1,629
1991	1,321	456	270	229	2,276
1992	1,113	365	320	133	1,931
1993	814	451	454	118	1,836
1994	974	351	524	112	1,961
1995	1,044	606	629	126	2,405
1996	899	514	760	154	2,328
1997	1,077	715	823	212	2,827
1998	839	725	922	261	2,747
1999	1,293	929	1,210	357	3,789
2000	1,543	650	693	352	3,238
2001	1,191	922	756	395	3,264
2002	1,164	620	915	676	3,375
Average	987.3	561.6	571.1	215.3	2,335.4
SD	299.4	188.5	314.9	164.3	816.9

Figure 18. Hawaii mahimahi catch, 1987-2002.

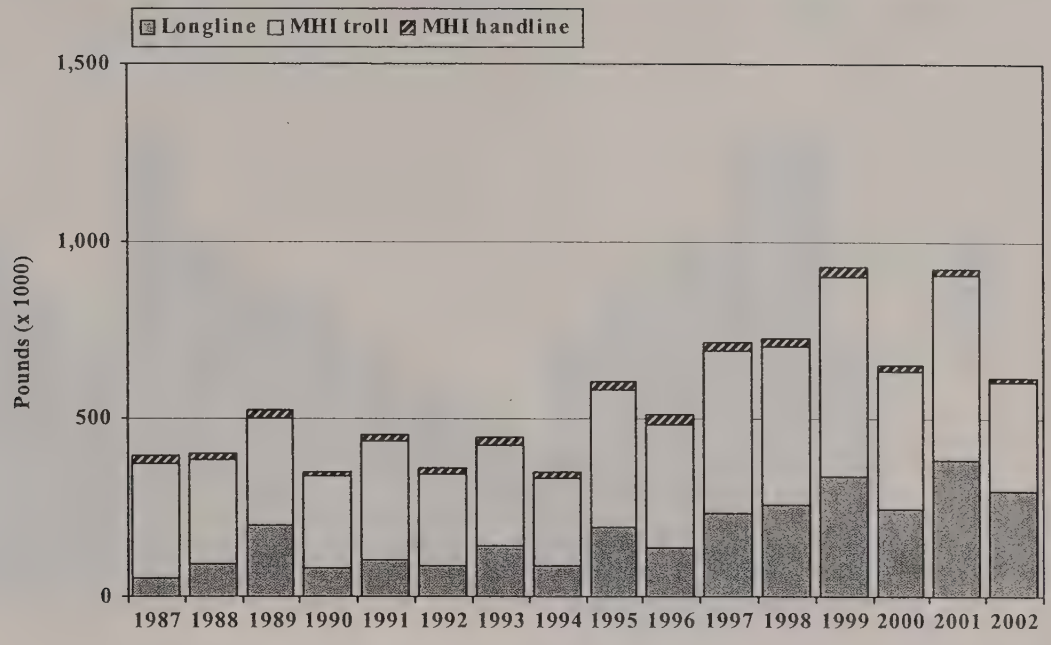


Interpretation: Total catch of mahimahi varied substantially over the 15-year period. The MHI troll fishery usually had the highest mahimahi catches, although this fishery showed no clear trend. In contrast, catches by the longline fishery were much higher in the 1990's and 2000's than in the 1980's. There were also small catches of mahimahi by the MHI handline, offshore handline, and aku boat fisheries.

Source and Calculations: Longline mahimahi catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Mahimahi catch by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Mahimahi catch (1000 lbs)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	45	579	78	-	2	704
1988	39	264	25	-	4	332
1989	183	379	34	-	1	596
1990	366	491	37	0	0	894
1991	555	718	44	5	0	1,321
1992	593	461	24	21	14	1,113
1993	316	444	27	23	3	814
1994	377	546	33	18	0	974
1995	570	419	35	20	0	1,044
1996	375	451	56	17	0	899
1997	518	517	27	9	5	1,077
1998	336	464	26	13	0	839
1999	679	545	49	20	0	1,293
2000	721	731	45	46	0	1,543
2001	530	584	42	36	0	1,191
2002	638	484	27	15	0	1,164
Average	427.6	504.8	38.0	18.7	1.9	987.3
SD	210.3	116.4	14.3	12.1	3.6	299.4

Figure 19. Hawaii ono catch, 1987-2002.

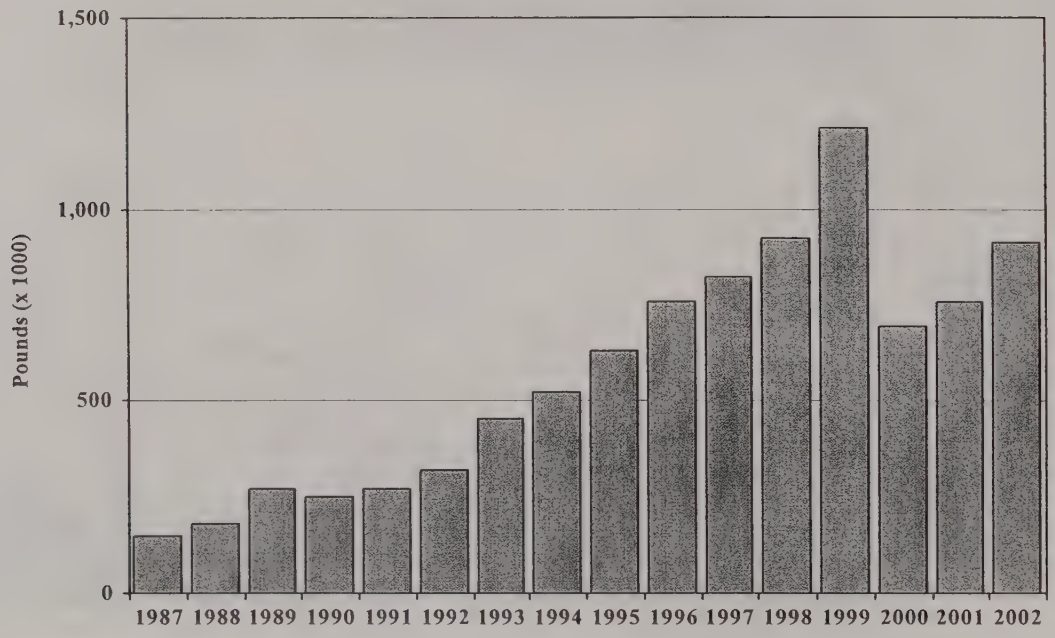


Interpretation: Ono catches were consistently above 500 thousand pounds from 1995 and was attributed to increasing catches by the longline fishery and above average catches by the MHI troll fishery. The MHI troll fishery consistently had the largest ono catches accounting for about two-thirds of the total catch.

Source and Calculations: Longline ono catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Ono catch by the troll and handline fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Ono catch (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	53	324	23	400
1988	90	298	18	406
1989	202	298	22	522
1990	80	262	11	352
1991	101	337	18	456
1992	85	262	18	365
1993	142	286	22	451
1994	87	245	19	351
1995	195	388	23	606
1996	140	347	27	514
1997	239	451	25	715
1998	262	442	21	725
1999	343	558	28	929
2000	246	387	17	650
2001	388	516	17	922
2002	298	306	16	620
Average	184.4	356.8	20.4	561.6
SD	103.2	93.3	4.5	188.5

Figure 20. Hawaii moonfish catch, 1987-2002.

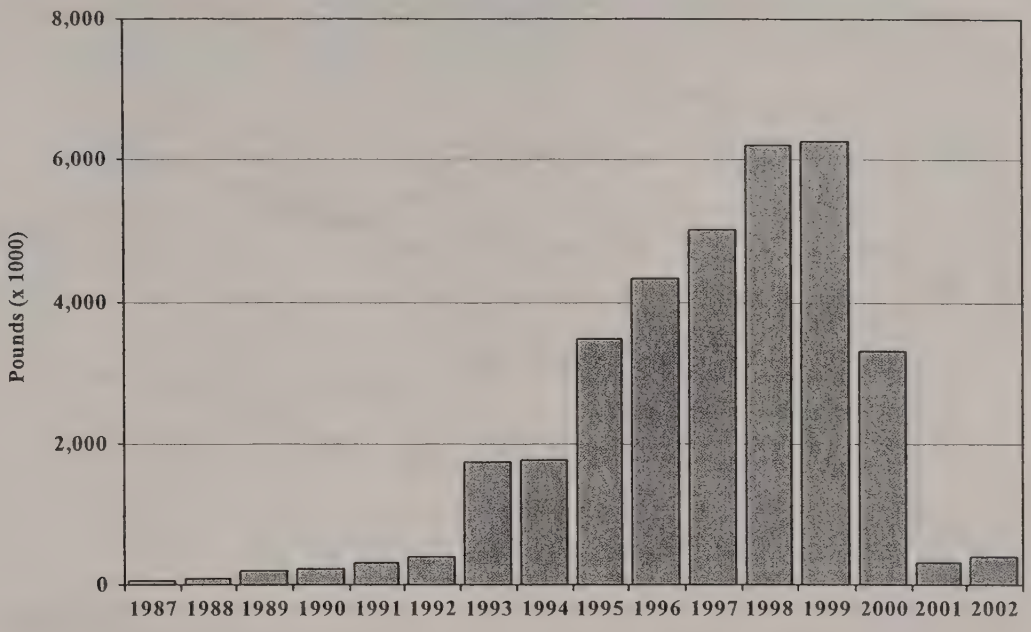


Interpretation: Moonfish is caught exclusively on longline gear. Moonfish catches increased to 1.2 million pounds in 1999; almost 8 times more than the catch observed in 1987.

Source and Calculations: Longline moonfish catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data.

	Moonfish catch (1000 lbs)	
Year	Longline	Total
1987	152	152
1988	182	182
1989	274	274
1990	253	253
1991	270	270
1992	320	320
1993	454	454
1994	524	524
1995	629	629
1996	760	760
1997	823	823
1998	922	922
1999	1,210	1,210
2000	693	693
2001	756	756
2002	915	915
Average	571.1	571.1

Figure 21. Hawaii shark catch, 1987-2002.

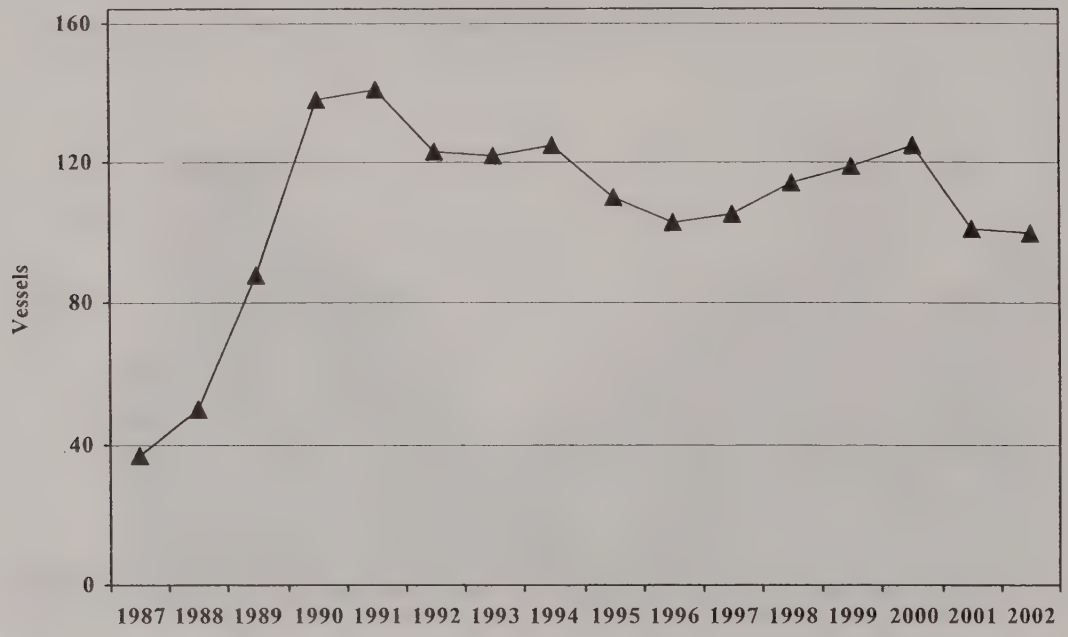


Interpretation: Sharks were caught exclusively on longline gear. Shark catch increased dramatically from 1987 to a peak of 6.3 million pounds in 1999. Sharks were landed headed and gutted in the late 1980's but a market for shark fins began in the early 1990's. Finning sharks then became widespread throughout the longline fishery. Shark catch dropped by 47% in 2000 due to a state law that prohibited the practice of finning sharks which was passed in the middle of the year. This was followed by a federal Shark Finning Prohibition Act passed at the end of the year. The full effect of these regulatory measures were responsible for a 90% decline in shark catch observed in 2001. Shark catch remained low in 2002.

Source and Calculations: Mako and thresher shark catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. When the practice was allowed, blue and other sharks were finned. Although their carcasses were discarded at sea, these still represented a kept and landed fish. These finned shark catches were also extrapolated to whole weight by multiplying the number of sharks finned by an average weight from the observer data as a crude method to estimate shark biomass.

	Total shark catch (1000 lbs)	
Year	Longline	Total
1987	43	43
1988	94	94
1989	203	203
1990	222	222
1991	318	318
1992	410	410
1993	1,736	1,736
1994	1,761	1,761
1995	3,468	3,468
1996	4,327	4,327
1997	5,010	5,010
1998	6,212	6,212
1999	6,272	6,272
2000	3,297	3,297
2001	327	327
2002	388	388
Average	2,130.5	2,130.5
SD	2,291.5	2,291.5

Figure 22. Number of Hawaii-based longline vessels, 1987-2002.

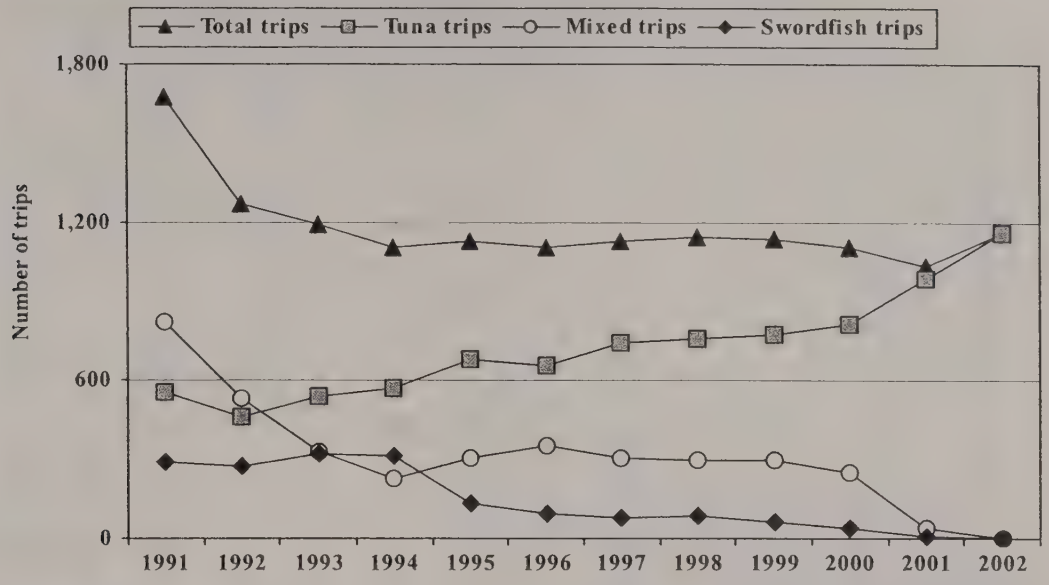


Interpretation: The number of active Hawaii-based longline vessels rose rapidly from 37 in 1987, to a peak of 141 vessels in 1991 and was followed by a decline to 103 vessels in 1996. Vessel activity grew slowly peaking at 125 in 2000 then dropped suddenly to 101 the following year. The drop observed in 2001 was due to Hawaii-based longline vessels leaving the fishery due to the prohibition of shallow-set gear,which caused vessels to move California, where they continued to target swordfish. Other vessels converted their gear and techniques to deep-set longline in order to target tuna.

Source and Calculations: The number of Hawaii-based longline vessels was compiled from the NMFS marketing monitoring data from 1987-1990 and the NMFS longline logbook data from 1991-2002.

Year	Vessels
1987	37
1988	50
1989	88
1990	138
1991	141
1992	123
1993	122
1994	125
1995	110
1996	103
1997	105
1998	114
1999	119
2000	125
2001	101
2002	100
Average	106.3
SD	28.3

Figure 23. Number of trips by the Hawaii-based longline fishery, 1991-2002.

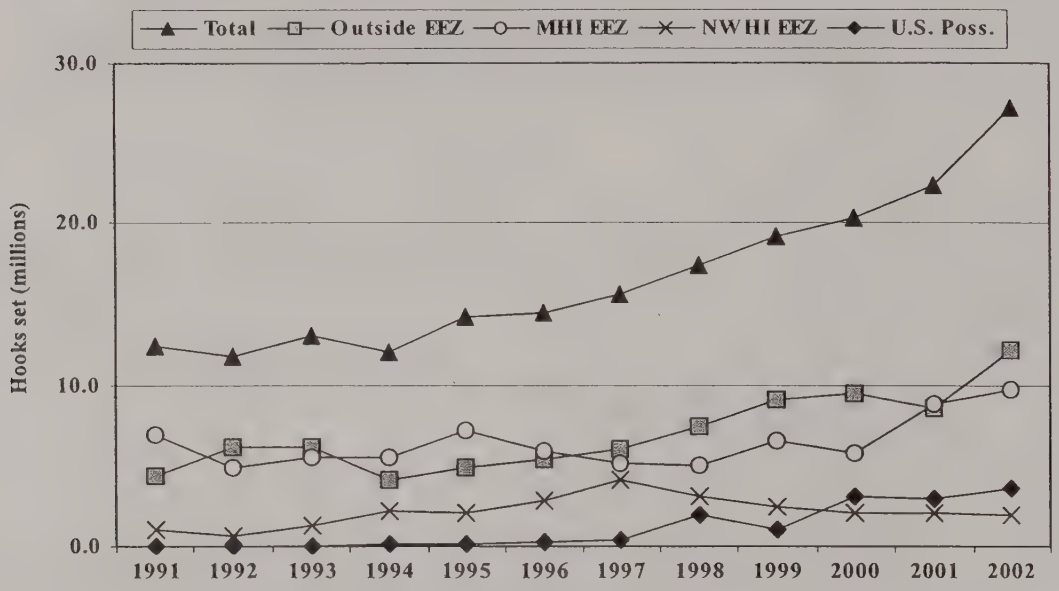


Interpretation: The first year in this 12-year time series, 1991, had significantly more trips than all subsequent years. The total number of Hawaii-based longline trips declined sharply in 1992 because a moratorium on new vessels from entering the fishery was implemented. Trip activity stabilized thereafter but there was a shift in effort from swordfish and mixed target trips toward tuna targeted trips. Swordfish and mixed target trips effort was highest in the early 1990's and stabilized up to 2000 then declined dramatically in 2001 due to the prohibition on shallow-set longline gear in that year. There was no swordfish or mixed targeted trips in 2002. In contrast, tuna trips increased from a low of 458 trips in 1992 to a record 1,162 trips made in 2002.

Source and Calculations: Number of trips were compiled from NMFS federal longline logbook data collected from 1991 to 2002. The trip type was determined by an interview with the vessel captain or assigned by FMEP staff on the basis of gear characteristics, fishing techniques and locations, catch composition and past targeting strategy.

	Hawaii longline trip activity			
Year	Total trips	Tuna trips	Mixed trips	Swordfish trips
1991	1,671	556	823	292
1992	1,266	458	531	277
1993	1,192	542	331	319
1994	1,106	568	228	310
1995	1,125	682	307	136
1996	1,100	657	351	92
1997	1,125	745	302	78
1998	1,140	760	296	84
1999	1,137	776	296	65
2000	1,103	814	252	37
2001	1,034	987	43	4
2002	1,162	1,162	0	0
Average	**1,180.1**	**725.6**	**313.3**	**141.2**
SD	**164.5**	**199.1**	**211.5**	**123.0**

Figure 24. Number of hooks set by the Hawaii-based longline fishery, 1991-2002.



Interpretation: The total number of hooks set by the Hawaii-based longline fishery has increased steadily since 1991 to a record 27.2 million hooks in 2002. Much of the increase is due to the shift in effort from swordfish and mixed target to tuna. Tuna sets typically set more hooks per day than swordfish and mixed target set types. Most of the hooks set were in the areas outside the EEZ (44%) and MHI EEZ (36%) in 2002. Effort in the EEZ of U.S. possessions (13%), particularly Johnston Atoll, Palmyra Atoll, and Kingman Reef has been increasing from the mid 1990's while effort in the NWHI EEZ (7%) has been in decline during the same time period.

Source and Calculations: Number of hooks set were compiled from NMFS federal longline logbook data which were collected from 1991 to 2002.

	Number of hooks set by area (milions)				
Year	Outside EEZ	MHI EEZ	NWHI EEZ	U.S. Poss.	Total
1991	4.4	6.9	1.1	0.1	12.3
1992	6.1	4.9	0.7	0.0	11.7
1993	6.2	5.6	1.3	0.0	13.0
1994	4.1	5.5	2.2	0.2	12.0
1995	4.9	7.1	2.0	0.2	14.2
1996	5.4	5.9	2.9	0.2	14.4
1997	6.0	5.1	4.1	0.4	15.6
1998	7.4	5.0	3.1	1.9	17.4
1999	9.1	6.6	2.4	1.1	19.1
2000	9.5	5.7	2.1	3.0	20.3
2001	8.6	8.8	2.0	2.9	22.4
2002	12.1	9.7	1.9	3.5	27.2
Average	7.0	6.4	2.1	1.1	16.6
SD	2.4	1.5	0.9	1.3	4.8

Table 3. Distance traveled to first set by the Hawaii-based longline fleet, 1991-2002.

	Miles to first set							
	Average				Maximum			
Year	Tuna trips	Mixed trips	Sword trips	Fleet mean	Tuna trips	Mixed trips	Sword trips	Fleet mean
1991	240	276	585	318	1,508	1,408	1,792	1,792
1992	260	404	733	424	1,156	1,543	1,871	1,871
1993	222	522	820	465	1,432	1,616	2,122	2,122
1994	252	323	833	430	945	1,298	2,814	2,814
1995	273	397	884	441	945	1,609	2,097	2,097
1996	284	410	790	367	1,866	1,547	2,037	2,037
1997	288	365	623	332	1,002	1,323	1,973	1,973
1998	384	439	708	422	1,154	1,611	1,522	1,611
1999	313	490	821	388	1,160	1,723	1,791	1,791
2000	472	674	879	557	1,461	1,747	1,945	1,949
2001	345	408	1,295	353	1,357	1,451	1,546	1,546
2002	370	---	---	370	1,378	---	---	1,378
Average	**308.6**	**428.0**	**815.5**	**405.6**	**1,280.3**	**1,534.2**	**1,955.5**	**1,915.1**
SD	**72.3**	**106.6**	**186.6**	**65.9**	**272.1**	**149.2**	**347.6**	**363.4**

Interpretation: The average miles to first set for the Hawaii-based longline fleet showed no clear trend from 1991 through 2002. Swordfish trips traveled the farthest average distance before making their first set while tuna trips traveled the shortest average distance. Tuna trips showed a general increase during 1991-2002 with distance increasing suddenly in excess of 300 miles in 1998. The average distance to first set was lowest in 1991 for both swordfish and mixed trips and showed no clear pattern thereafter.

The maximum miles to first set for the Hawaii-based longline fleet exceeded 2000 miles from 1993 to 1996 due to the long distances traveled by vessel making swordfish trips. Swordfish trips typically had the highest maximum distance to first set while tuna trips usually had the shortest maximum distance to first set.

Source and Calculation: The miles to first set was calculated as the distance from Honolulu to the first set as recorded in the federal longline logbook. The average and maximum miles to first set must be interpreted with caution because they may include atypical trips such as those that departed from California and landed in Hawaii. This type of trip activity was included since these vessels were permitted to operate in the Hawaii-based longline fishery. In contrast, trips which vessels departed from Hawaii and landed in California were not included.

Table 4. Number of days fished per trip for the Hawaii-based longline fleet, 1991-2002.

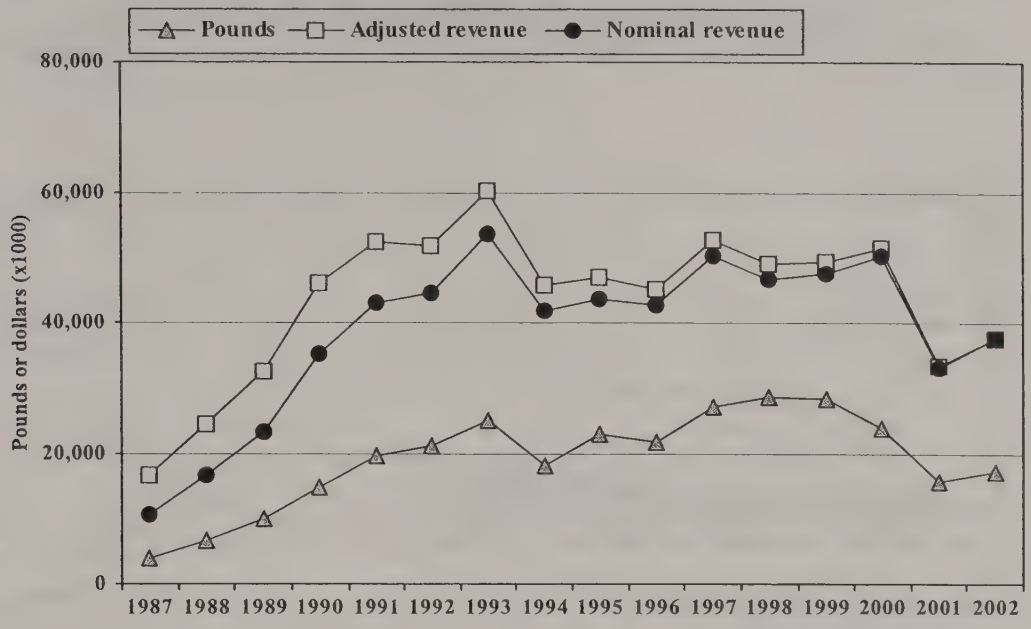
	Days fished per trip							
	Average				Maximum			
Year	Tuna trips	Mixed trips	Sword trips	Fleet mean	Tuna trips	Mixed trips	Sword trips	Fleet mean
1991	7.7	6.3	10.7	7.6	18	22	26	22
1992	8.4	7.8	12.7	9.1	14	21	26	26
1993	8.8	9.6	13.7	10.3	14	23	29	29
1994	8.9	8.0	13.4	10.0	16	19	26	26
1995	10.0	9.3	13.2	10.3	20	26	27	27
1996	10.3	10.3	12.7	10.5	28	30	28	30
1997	10.1	10.6	14.1	10.5	19	36	27	36
1998	10.3	11.9	14.5	10.9	17	24	24	24
1999	11.1	11.7	12.5	11.4	19	26	22	26
2000	11.0	13.3	15.5	11.7	19	29	25	29
2001	11.8	10.7	10.0	11.7	20	19	18	20
2002	12.0	---	---	12.0	21	---	---	21
Average	**10.0**	**10.0**	**13.0**	**10.5**	**18.8**	**25.0**	**25.3**	**26.3**
SD	**1.4**	**2.0**	**1.6**	**1.2**	**3.7**	**5.2**	**3.1**	**4.4**

Interpretation: There was a increasing trend for average number of days fished per trip for the Hawaii-based longline fleet. The average number of days fished per trip increased from 7.6 days per trip to a record 12.0 days fished per trip in 2002. This represents almost a 60% increase over the 12 year period. Swordfish trips had the highest number of fishing days per trip while tuna trips usually made the least number of sets.

Swordfish trips or mixed target trips had the highest maximum number of fishing days per trip while tuna trips had the lowest of the three trip types.

Source and Calculation: Average and maximum number of days fished per trip were compiled from federal longline logbook data. The number of days fished per trip is a summary of number of sets and hauls occurred on an individual trip and does not include travel days or otherwise not fishing.

Figure 25. Hawaii longline catch and revenue, 1987-2002.



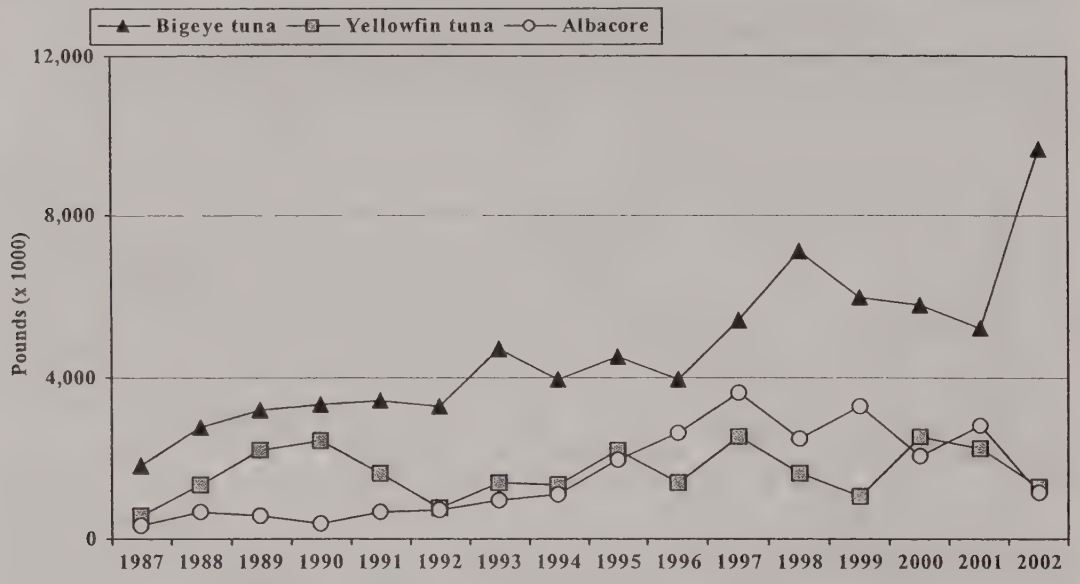
Interpretation: Total catch by the Hawaii-based longline fishery rose six-fold from 1987 to 1993. This was caused by increases in the number of vessels participating in the fishery and by growth in longline effort directed toward swordfish. Catch remained relatively stable until 1999 but decreased 45% over the next two years due to lower shark and swordfish catches. A record bigeye tuna catch helped boost catch by 10% in 2002.

The pattern for revenue was similar to catch; it showed a rapid increase in the late 1980s and early 90s followed by a period of stability through 2000 and a significant decline in 2001 largely due to a $12 million drop in swordfish revenue.

Source and Caluculations: Longline catch and ex-vessel revenue estimates were compiled by the NMFS Honolulu Laboratory. The catch and revenue estimates were calculated by extrapolating NMFS and HDAR market sampling data from 1987 through 1991, combining the number of fish from the federal logbook catch data with the average weight per fish and average price per pound from the market sample data during 1992 to 2001, and State electronic dealer data in 2002.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu Consumer Price Index
1987	3,890	$ 16,600	$ 10,600	114.9
1988	6,710	$ 24,400	$ 16,500	121.7
1989	9,940	$ 32,500	$ 23,200	128.7
1990	14,730	$ 46,100	$ 35,300	138.1
1991	19,480	$ 52,300	$ 42,900	148.0
1992	21,110	$ 51,600	$ 44,400	155.1
1993	25,010	$ 60,100	$ 53,400	160.1
1994	18,140	$ 45,800	$ 41,800	164.5
1995	22,720	$ 46,800	$ 43,600	168.1
1996	21,550	$ 45,100	$ 42,700	170.7
1997	27,150	$ 52,500	$ 50,100	171.9
1998	28,630	$ 49,000	$ 46,600	171.5
1999	28,350	$ 49,300	$ 47,400	173.3
2000	23,810	$ 51,300	$ 50,200	176.3
2001	15,550	$ 33,400	$ 33,000	178.4
2002	17,160	$ 37,500	$ 37,500	180.3
Average	19,000.0	$43,390.0	$38,700.0	
SD	7,420.0	$11,540.0	$12,300.0	

Figure 26. Hawaii longline tuna catch, 1987-2002.

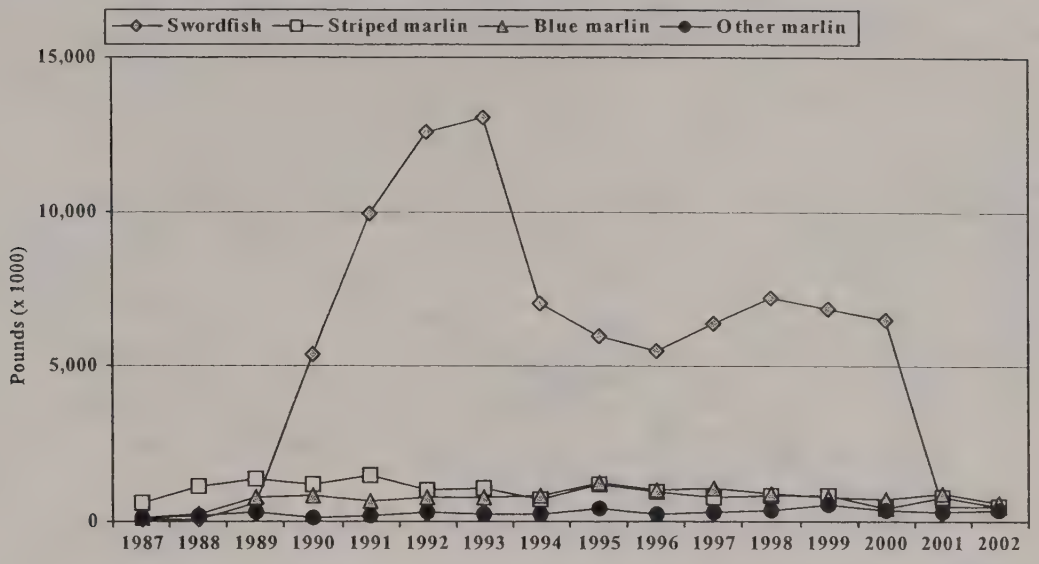


Interpretation: The three major tuna species caught by the Hawaii-based longline fishery are bigeye tuna, yellowfin tuna, and albacore. Bigeye tuna was the largest component of the longline catch. Catches for bigeye tuna and albacore were on a upward trend up through the late 1990s due to increased effort directed towards tunas, but then declined in the early 2000s. Bigeye tuna catch then rose to a record level in 2002 while albacore continued on a downward trend. Yellowfin catch has been on a gradual increase from 1992. The longline fishery also caught small amounts of skipjack tuna and bluefin tuna.

Source and Calculations: Longline tuna catch estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002.

	Hawaii longline tuna catch (1000 lbs)					
Year	Bigeye tuna	Yellowfin tuna	Albacore	Skipjack tuna	Bluefin tuna	Total
1987	1,796	575	331	3	0	2,705
1988	2,732	1,309	676	8	0	4,725
1989	3,178	2,174	547	22	0	5,921
1990	3,338	2,421	390	12	1	6,162
1991	3,423	1,617	687	66	4	5,797
1992	3,277	763	735	49	84	4,908
1993	4,677	1,392	965	79	92	7,205
1994	3,940	1,336	1,095	116	53	6,540
1995	4,522	2,159	1,938	223	56	8,898
1996	3,940	1,389	2,606	91	48	8,074
1997	5,399	2,515	3,626	234	52	11,826
1998	7,113	1,592	2,450	168	36	11,359
1999	5,995	1,042	3,250	219	23	10,529
2000	5,788	2,506	2,026	206	8	10,534
2001	5,217	2,233	2,802	466	2	10,720
2002	9,669	1,257	1,156	281	2	12,365
Average	4,625.3	1,642.5	1,580.0	140.2	28.8	8,016.8
SD	1,921.1	620.1	1,088.4	126.5	31.7	2,939.8

Figure 27. Hawaii longline billfish catch, 1987-2002.



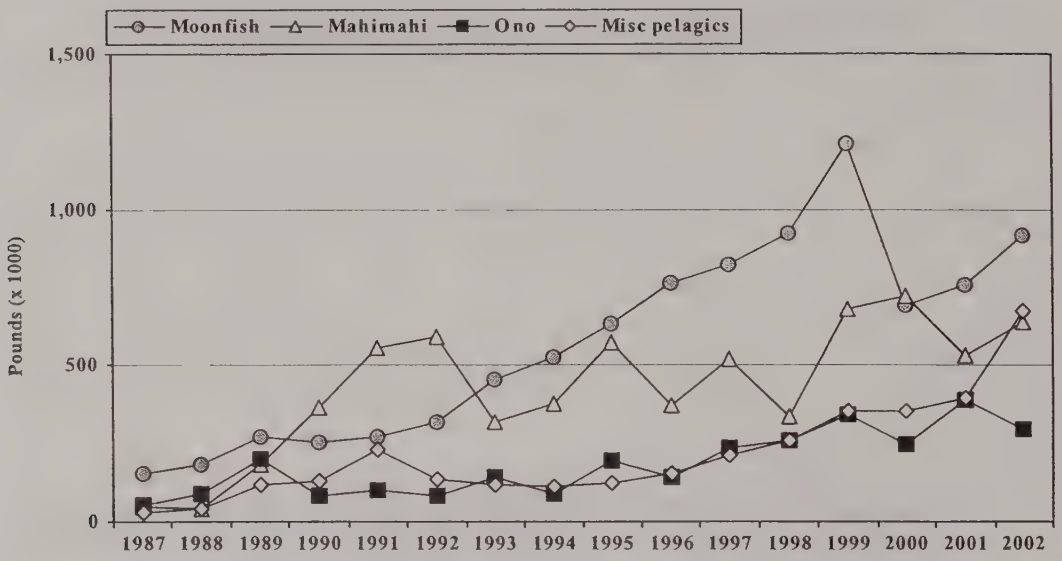
Interpretation: Swordfish was the dominant component of the billfish catch by the Hawaii-based longline fishery from 1990 through 2000. This catch rose rapidly in the early 1990s to a peak in 1993 as a result of increased effort directed towards swordfish. Swordfish catch dropped the following year and remained relatively stable through 2000 but decreased substantially in 2001 and remained low in 2002. The decrease in swordfish catch was caused by the prohibition of targeting swordfish to reduce the turtle interactions.

Marlins are caught incidentally by the longline fishery, but are retained because they sell for a moderate market price. Longline catch of blue marlin remained stable from 1989 with slightly higher catches in 1995 through 1997. Blue marlin was the largest component of the longline catch in 2001. Striped marlin catch has been on a downward trend with a record low catch in 2001. Striped marlin was the largest component of the billfish catch in the late 1980s.

Source and Calculations: Longline billfish catch estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002.

	Hawaii longline billfish catch (1000 lbs)				
Year	Swordfish	Striped marlin	Blue marlin	Other marlin	Total
1987	52	599	112	99	862
1988	52	1,110	225	150	1,537
1989	619	1,350	784	290	3,043
1990	5,372	1,186	834	127	7,519
1991	9,939	1,462	654	153	12,208
1992	12,566	1,013	765	312	14,656
1993	13,027	1,039	748	220	15,034
1994	7,002	719	798	218	8,737
1995	5,981	1,198	1,257	401	8,837
1996	5,517	923	1,030	253	7,723
1997	6,352	775	1,074	316	8,517
1998	7,193	834	870	380	9,277
1999	6,835	803	787	533	8,958
2000	6,502	441	692	335	7,970
2001	485	775	879	299	2,438
2002	450	498	582	353	1,883
Average	755.7	920.3	5,496.5	277.4	7,449.9
SD	283.6	294.4	4,234.9	114.6	4,447.2

Figure 28. Hawaii longline of other pelagic PMUS catch, 1987-2002.

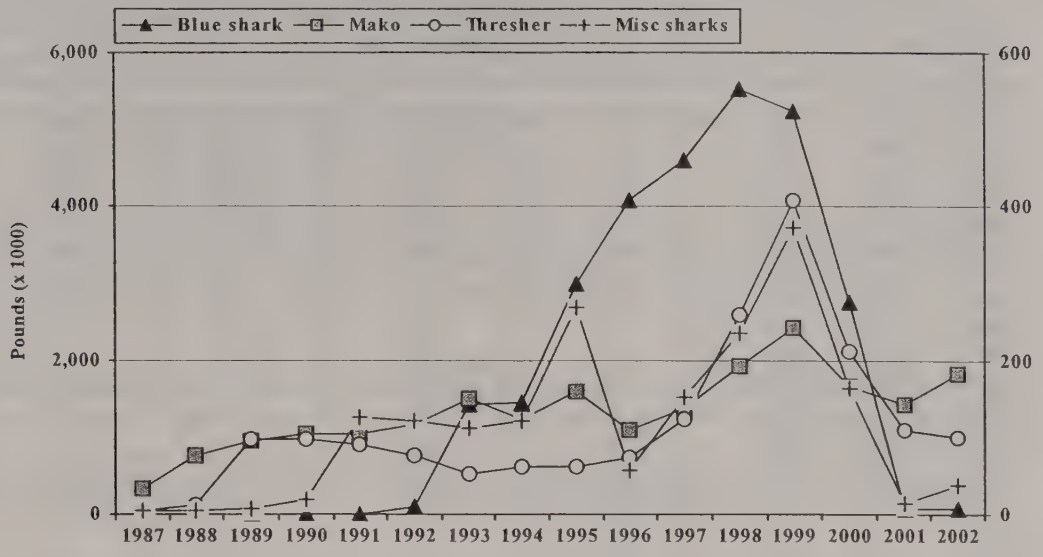


Interpretation: Longline landings of other pelagic species show a general increase. Moonfish and mahimahi were the two dominant catches in this category with moonfish peaking at 1.2 million pounds in 1999. Miscellaneous pelagic species, primarily pomfrets, increased slowly and reached a record high in 2002.

Source and Calculations: Longline catches of other pelagic PMUS estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002.

	Hawaii longline catch of other pelagic fish (1000 lbs)				
Year	Mahimahi	Moonfish	Ono	Misc pelagics	Total
1987	45	152	53	31	281
1988	39	182	90	43	354
1989	183	274	202	116	775
1990	366	253	80	130	829
1991	555	270	101	229	1,155
1992	593	320	85	133	1,131
1993	316	454	142	118	1,030
1994	377	524	87	112	1,100
1995	570	629	195	126	1,520
1996	375	760	140	154	1,429
1997	518	823	239	212	1,792
1998	336	922	262	261	1,781
1999	679	1,210	343	357	2,589
2000	721	693	246	352	2,012
2001	530	756	388	395	2,069
2002	638	915	298	676	2,527
Average	427.6	571.1	184.4	215.3	1,398.4
SD	210.3	314.9	103.2	164.3	694.8

Figure 29. Hawaii longline shark catch, 1987-2002.



Interpretation: Blue shark catch increased in the 1990s due to catch retained for fins only. Blue shark catch dropped significantly in 2000 and dropped further to negligible levels in 2001 and 2002 due to State and Federal laws which prohibited the practice of finning and landing sharks without the associated carcass. Mako and thresher sharks were retained for their flesh as well as their fins. Catches of mako and thresher sharks were an order of magnitude lower, although also increasing in the 1990s (Y-2 axis). Like blue sharks, miscellaneous shark catches (Y-2 axis) were also retained for fins only. Miscellaneous shark catches increased as the practice of finning sharks became widespread in the longline fleet decreased when regulations prohibited finning.

Source and Calculations: Mako and thresher shark catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. When the practice was allowed, blue and other sharks were finned. Although their carcasses were discarded at sea, these still represented a kept and landed fish. These finned shark catches were also extrapolated to whole weight by multiplying the number of sharks finned by an average weight from the observer data as a crude method to estimate shark biomass.

	Hawaii longline shark catch (1000 lbs)				
Year	Blue shark	Mako	Thresher	Misc sharks	Total
1987	0	33	5	5	43
1988	0	77	13	4	94
1989	2	95	98	8	203
1990	0	105	98	19	222
1991	0	104	89	125	318
1992	97	117	76	120	410
1993	1,423	150	51	112	1,736
1994	1,454	124	61	122	1,761
1995	2,978	160	62	268	3,468
1996	4,088	110	73	56	4,327
1997	4,598	137	123	152	5,010
1998	5,527	192	259	234	6,212
1999	5,249	242	409	372	6,272
2000	2,756	166	212	163	3,297
2001	62	143	108	14	327
2002	67	183	100	38	388
Average	1,768.8	133.6	114.8	113.3	2,130.5
SD	2,105.8	49.8	101.3	107.1	2,291.5

Table 5. Hawaii-based longline catch (number of fish) by area, 1991-2002.

	Tunas			Billfish				Miscellaneous			
Year	Bigeye tuna	Yellowfin tuna	Albacore	Swordfish	Blue marlin	Striped marlin	Other billfish	Mahimahi	Ono (wahoo)	Moonfish	Sharks
Main Hawaiian Islands											
1991	22,517	7,150	5,763	13,598	2,881	18,117	8,197	17,672	1,885	2,569	13,295
1992	22,982	3,846	3,979	7,102	2,761	9,838	3,368	13,313	1,194	2,387	11,748
1993	25,031	8,895	6,496	4,388	2,720	10,426	3,440	9,366	2,641	3,261	12,955
1994	27,022	6,815	10,833	2,842	3,344	6,494	3,213	17,660	1,332	3,626	14,455
1995	31,899	13,018	18,271	5,262	4,168	12,472	6,900	30,410	2,656	4,041	22,560
1996	29,803	7,715	19,259	4,634	3,556	7,163	3,404	11,676	1,527	3,094	19,418
1997	21,397	10,982	19,025	4,873	4,085	4,193	3,662	11,660	2,525	2,847	16,476
1998	26,723	4,678	12,482	4,721	1,698	4,856	4,254	7,664	2,305	3,585	14,685
1999	29,203	4,835	23,805	2,357	1,709	5,607	6,691	11,654	2,579	5,161	17,449
2000	21,546	5,240	5,952	2,510	1,557	2,438	3,486	17,586	1,201	2,759	16,561
2001	36,928	5,671	10,448	1,027	2,151	7,651	4,029	21,608	3,223	3,404	16,086
2002	51,177	2,463	2,706	752	873	3,449	3,761	21,374	1,345	3,373	14,810
Northwestern Hawaiian Islands											
1991	4,473	1,375	481	9,472	342	3,845	1,082	2,003	134	70	10,604
1992	2,624	396	311	5,228	244	1,776	330	2,321	77	187	9,042
1993	7,760	2,019	1,413	9,565	509	2,861	754	2,279	198	398	17,507
1994	10,726	2,015	5,592	9,752	554	2,679	719	3,037	227	707	28,346
1995	9,011	3,630	5,097	8,400	1,379	5,076	1,557	5,836	902	939	19,915
1996	15,409	2,451	12,738	3,987	1,114	4,184	1,651	1,995	659	2,388	16,539
1997	30,168	5,139	17,118	5,148	1,519	4,109	2,250	6,321	1,789	2,887	17,921
1998	16,629	2,713	6,802	10,611	1,217	5,757	2,927	3,527	761	1,862	20,152
1999	9,672	1,581	6,261	6,182	1,053	3,515	2,400	4,316	763	1,431	15,150
2000	7,660	1,395	2,969	6,679	418	2,309	1,082	6,458	224	750	11,446
2001	8,521	1,169	3,648	373	761	2,528	882	3,923	783	1,030	5,478
2002	9,492	806	1,897	109	295	1,352	1,339	3,485	313	882	4,950
U.S. Possessions											
1991	374	439	30	25	17	60	45	84	21	0	237
1992	70	42	0	16	7	1	7	6	8	0	223
1993	0	0	0	0	0	0	0	0	0	0	0
1994	1,127	1,649	151	53	37	173	55	37	77	24	705
1995	460	583	296	21	94	121	94	252	206	5	895
1996	766	1,184	1,612	17	86	192	93	49	155	57	756
1997	2,070	1,932	4,054	33	194	255	293	591	328	206	1,503
1998	17,666	6,313	3,784	174	308	307	450	831	1,127	258	5,892
1999	4,514	5,737	1,575	102	315	438	619	542	1,499	179	3,463
2000	7,483	21,788	8,766	234	762	733	916	1,202	1,916	448	8,307
2001	5,563	20,777	9,493	224	1,072	1,047	683	1,705	2,150	277	5,195
2002	18,110	12,826	6,342	532	778	1,015	765	957	2,429	377	7,660
Outside EEZ											
1991	13,559	4,305	7,777	43,194	1,008	6,730	3,511	19,766	695	440	47,047
1992	18,228	3,595	15,523	61,968	1,506	4,434	1,963	41,044	1,169	719	73,884
1993	22,008	5,147	22,551	65,601	1,895	4,920	1,486	14,367	1,600	856	124,139
1994	9,227	3,037	14,553	30,698	742	1,946	1,130	12,283	877	733	71,150
1995	18,577	6,419	22,125	23,745	3,165	4,885	3,220	23,315	2,801	1,382	57,922
1996	17,588	6,227	23,719	29,495	1,878	4,250	2,658	9,507	2,116	1,776	64,081
1997	26,149	10,990	30,887	29,627	2,457	4,080	2,819	30,730	3,668	2,314	49,935
1998	37,762	8,004	25,621	28,269	2,125	3,408	3,872	10,157	4,068	3,462	59,180
1999	36,883	4,817	35,659	29,323	1,857	4,857	7,401	27,743	5,435	5,628	51,475
2000	37,804	9,956	22,088	27,600	1,772	2,459	3,527	32,529	4,410	3,079	43,049
2001	27,712	9,460	27,841	2,545	2,440	5,209	3,414	17,715	7,225	3,068	20,152
2002	62,068	4,278	9,643	2,275	2,025	3,076	4,215	22,407	4,791	4,658	23,196

Interpretation: The bolded numbers in Table 5 show the areas with the highest catches. The highest bigeye tuna catches were observed in the MHI EEZ from 1991 to 1996. Catches remained high thereafter but bigeye tuna catch outside the EEZ was the most productive area for four of the past five years. A similar pattern occurred for yellowfin tuna catch also except the highest catches now occur in the EEZ of U.S. possessions, primarily Kingman Reef and Palmyra Atoll. Albacore catches were consistently highest outside the EEZ.

Swordfish catch from outside the EEZ was consistently the predominant area of capture over the past three years. Blue marlin catches was highest in the MHI EEZ up to 1997 and was replaced by outside the EEZ for the past five years. Striped marlin catch was typically highest in the MHI EEZ.

In general, catches mahimahi, ono, and moonfish were highest in the MHI EEZ but shifted outside the EEZ in the most recent years. The highest catches of sharks occurred outside the EEZ.

Source and Calculations: Catches by area were compiled from NMFS federal longline logbook data collected from 1991 to 2002.

Table 6. Average weight of the Hawaii-based longline catch by species, 1987-2002.

SPECIES	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
TUNAS																
Albacore	63	60	62	61	52	45	44	41	51	53	55	55	52	55	55	56
Bigeye tuna	77	83	77	81	85	77	88	81	79	64	71	74	75	80	69	71
Bluefin tuna				638	185	192	203	190	271	223	239	177	202	165	169	151
Skipjack tuna	18	19	19	21	20	17	17	18	18	17	20	20	20	17	18	16
Yellowfin tuna	82	103	104	122	118	99	93	97	95	80	89	76	62	67	63	62
BILLFISH																
Blue marlin	161	157	165	199	173	175	157	171	156	154	134	165	164	158	139	149
Striped marlin	66	57	62	62	58	66	64	64	58	58	66	60	55	59	48	55
Black marlin	208	151	191	204	184	155	136	167	72		190	167	131	136	633	222
Sailfish	52	51	55	55	51	45	49	55	47	40	46	43	45	56	45	59
Spearfish	34	31	31	35	32	34	34	33	33	31	31	32	29	35	31	33
Swordfish	129	119	130	152	153	178	171	163	171	157	163	176	188	185	133	146
OTHER PMUS																
Mahimahi	21	20	23	19	15	11	13	12	10	17	13	16	16	14	12	14
Ono (wahoo)	33	32	35	36	32	35	33	34	31	31	30	32	34	32	29	33
Moonfish	111	108	104	98	97	98	101	103	101	105	103	101	98	100	99	98
Oilfish	20	22	23	22	23	22	21	13	23					18	16	17
Pomfrets	15	18	18	18	17	16	16	17	16	15	17	15	14	14	13	13
SHARKS																
Mako shark	124	137	161	162	135	144	147	153	178	177	161	177	177	182	181	na
Thresher shark	97	122	158	167	180	176	199	164	172	156	160	171	202	162	171	na

Interpretation: Longline fishing effort can cover a large area within a trip. The data on individual fish from the market data cannot be directly linked to the exact area of capture, therefore, the average weight by location was referenced in general terms.

The three main tuna species did not exhibit uniform changes throughout 1987-2002. The average weight of albacore was about 60 pounds until 1990 then declined to less than 50 pounds during 1992-94. This decline was related to increasing incidental catches of small albacore north of the Hawaiian Islands by longliners targeting swordfish. The average weight of albacore then increased as a greater proportion of longline effort shifted further south to target tunas. The average weight of albacore was 56 pounds in 2002. The average weight of bigeye tuna showed the least amount of change of the three main tuna species, ranging from 64 pounds to 88 pounds. Bigeye tuna average weight was 71 pounds in 2002. In contrast, yellowfin tuna average weight showed the most variation ranging from 62 pounds to 122 pounds. The average weight of yellowfin tuna was more than 100 pounds during 1988-1991 and decreased to less than 70pounds from 1999 with average weight at 62 pounds in 2002. This probably reflects a trend of increasing effort in the EEZ of Kingman Reef and Palmyra Atoll where relatively small yellowfin tuna are caught.

Swordfish caught on tuna target trips are biased towards small swordfish in comparison to swordfish target trips. Average weight for swordfish was lowest in the late 1980s when the longline fishery targeted tunas only. The average weight increased in the early 1990s with as the number of swordfish target trips grew. Average weight peaked at 188 pounds in 1999 and was about the same in the following year. However, swordfish effort (shallow-set longlining) was restricted in 2001 and prohibited altogether in 2002 and as a result effort was almost exclusively directed towards tuna target (deep-set longline). The average weight then dropped to 133 pounds in 2001 and increased slightly to 146 pounds in 2002.

Average weight of blue marlin ranged from 199 pounds in 1990 to 133 pounds in 1997 and was 149 pounds in 2002. Average weight of striped marlin show very little variation over the 16 year period ranging from 48 pounds in 2001 to 66 pounds in 1987, 1992 and 1997 and was 55 pounds in 2002.

Source and Calculations: Average weight of the longline catch was summarized from the NMFS, Honolulu Laboratory and HDAR market sampling data. With the exception of swordfish and sharks, most of the longline catch was landed whole. When fish were processed prior to sale, e.g., headed and gutted, gilled and gutted, a conversion factor was applied to convert it to an estimated whole weight. Discarded fish and sharks that were retained for fins only were not represented in these size summaries.

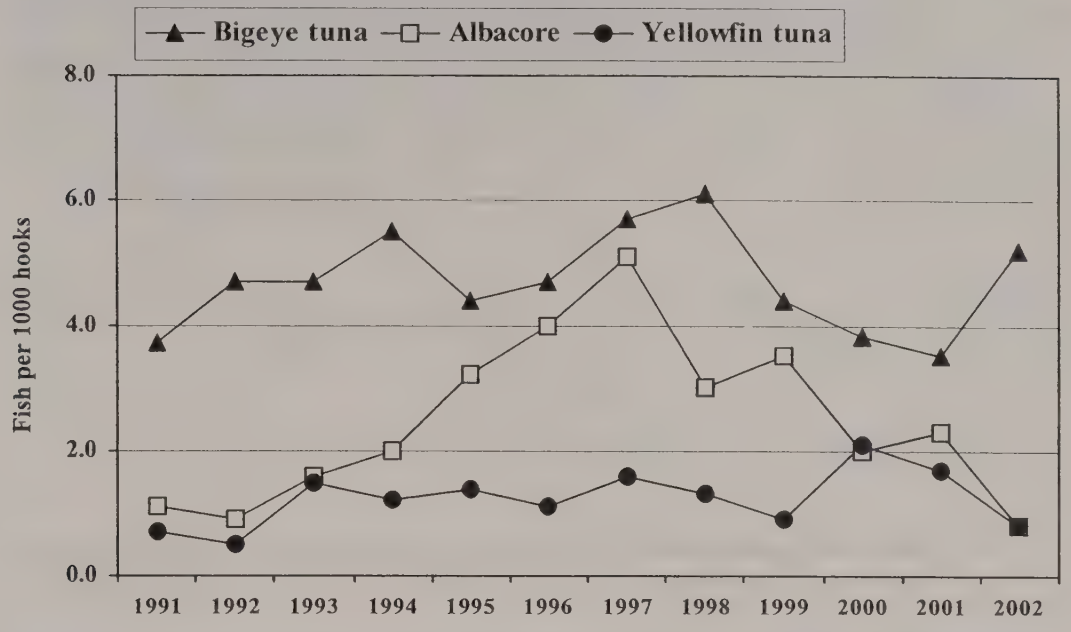
Table 7. Bycatch, retained catch, and total catch for the Hawaii-based longline fishery, 2002.

Interpretation: Bycatch of the Hawaii-based longline fishery was measured in number of fish released. The total bycatch for all species combined was 15% in 2002. Sharks accounted for 80% of the total longline bycatch and 90% percent of all sharks caught were released. Mako and thresher sharks are kept for their flesh but almost all other species of sharks are not marketable and therefore discarded. Tunas, which are the primary target species of the longline fleet, had the lowest release rate (3%). Although billfish and other miscellaneous pelagic catch are not targeted, these species are highly marketable and also have low rates of discards (5% and 4%, respectively).

Source and Calculations: Longline bycatch totals and percentages were compiled from Federal daily longline logbooks. Longline bycatch was summarized as number of fish released.

	Number released	Percent released	Kept	Caught
Tuna				
Albacore	134	0.7	20,455	20,589
Bigeye tuna	3,450	2.4	137,397	140,847
Bluefin tuna	3	20.0	12	15
Skipjack tuna	2,372	11.7	17,816	20,188
Yellowfin tuna	574	2.8	19,801	20,375
Other tuna	1	0.8	129	130
Billfish				
Blue marlin	76	1.9	3,895	3,971
Spearfish	291	3.1	9,192	9,483
Striped marlin	165	1.9	8,727	8,892
Other marlin	13	2.2	584	597
Swordfish	713	19.4	2,955	3,668
Other pelagic fish				
Mahimahi	951	2.0	47,272	48,223
Moonfish	75	0.8	9,215	9,290
Oilfish	247	2.1	11,383	11,630
Pomfret	540	1.4	36,736	37,276
Wahoo	71	0.8	8,807	8,878
Miscellanous fish	2,750	76.3	852	3,602
Sharks				
Blue shark	39,263	98.4	653	39,916
Mako shark	899	47.0	1,012	1,911
Thresher shark	4,526	89.2	549	5,075
Other sharks	3,522	94.8	195	3,717
Total	60,636	15.2	337,637	398,273

Figure 30. Hawaii longline CPUE for major tunas on tuna trips, 1991-2002.



Interpretation: Tuna-target trips usually had the highest catch rate for bigeye tuna which is the primary target species. Bigeye tuna CPUE was consistently higher than those for albacore or yellowfin tuna. In general, bigeye tuna CPUE increased from 1991 and peaked in 1998. Bigeye tuna then declined for the next three years to a record low of 3.5 in 2001 then rebounded to 5.2 fish per 1000 hooks in 2002. Bigeye tuna CPUE was highest in the MHI EEZ.

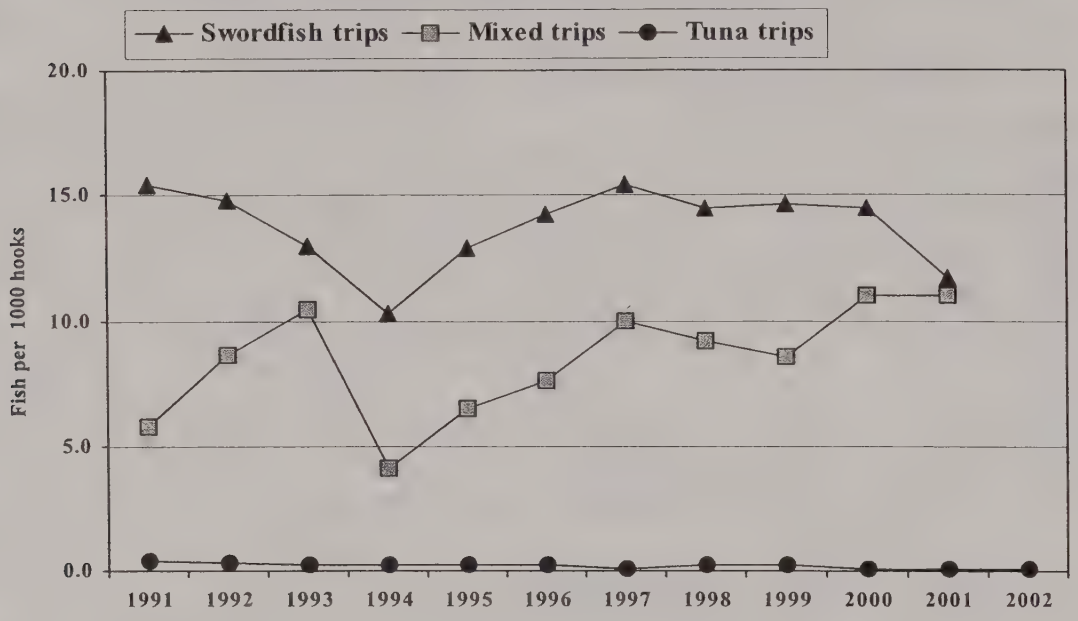
Since the average price for albacore is substantially lower than those for bigeye and yellowfin tuna, it is targeted only infrequently and is more often caught incidentally. Albacore CPUE rose rapidly in the early 1990s, peaked in 1997, then declined to a record low of 0.8 fish per 1000 hooks in 2002. Albacore CPUE is usually higher outside of the U.S. EEZ.

CPUE for yellowfin tuna was usually the lowest of the three major tuna species. Yellowfin tuna CPUE was lowest in 1992, increased slightly the following year, remained relatively stable until 1999, peaked in 2000 and then declined thereafter. The higher than usual yellowfin tuna CPUEs were observed in 2000 and 2001 due to high catches in the EEZ of Kingman Reef and Palmyra Atoll.

Source and Calculation: Longline tuna catch rates were compiled from federal daily longline logbooks. CPUE (catch-per-unit-effort) was based on number of fish caught per 1,000 hooks set.

	Tuna trip CPUE (fish per 1000 hooks)		
Year	Bigeye tuna	Albacore	Yellowfin tuna
1991	3.7	1.1	0.7
1992	4.7	0.9	0.5
1993	4.7	1.6	1.5
1994	5.5	2.0	1.2
1995	4.4	3.2	1.4
1996	4.7	4.0	1.1
1997	5.7	5.1	1.6
1998	6.1	3.0	1.3
1999	4.4	3.5	0.9
2000	3.8	2.0	2.1
2001	3.5	2.3	1.7
2002	5.2	0.8	0.8
Average	**4.8**	**2.6**	**1.3**
SD	**0.8**	**1.3**	**0.5**

Figure 31. Hawaii longline swordfish CPUE by trip type, 1991-2002.



Interpretation: Swordfish CPUE varies considerably depending upon the target species, and for this reason average swordfish CPUE for the longline fleet was not a accurate measurement of fishery performance. Effort with "shallow" longline gear, which is the typical method of fishing for swordfish and mixed trips, was drastically reduced in 2001 and prohibited in 2002 due to sea turtle conservation measures. Therefore, swordfish CPUE for these trips types was unavailable in 2002.

Swordfish-targeted trips had the highest swordfish CPUE of all trip types. Swordfish CPUE on swordfish target trips declined to a low in 1994 but returned to typical swordfish catch rates through 2000. Swordfish target effort was curtailed substantially in 2001,leading to a 19% derease in CPUE.

Mixed-target trips (swordfish and tuna target) had intermediate swordfish catch rates. Mixed-target trips also exhibited a record low swordfish CPUE in 1994, and this decline was greater than that of the swordfish-target trips. The CPUE for this trip type then increased from this record low to peak catch rates in 2000 and 2001.

Tuna-target trips had very low swordfish CPUEs throughout the monitoring period.

	Swordfish CPUE (fish per 1000 hooks)		
Year	Swordfish trips	Mixed trips	Tuna trips
1991	15.4	5.8	0.4
1992	14.8	8.6	0.3
1993	13.0	10.4	0.2
1994	10.3	4.1	0.2
1995	12.9	6.5	0.2
1996	14.2	7.6	0.2
1997	15.4	10.0	0.1
1998	14.5	9.2	0.2
1999	14.6	8.5	0.2
2000	14.5	11.0	0.1
2001	11.7	11.0	0.1
2002	---	---	0.1
Average	13.6	8.7	0.2
SD	1.6	2.2	0.1

Source and Calculation: Longline swordfish catch rates were compiled from federal daily longline logbooks. CPUE (catch-per-unit-effort) was based on number of fish caught per 1,000 hooks set. Trips were categorized by longline captains or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessels' fishing history and gear configuration. Trips were categorized as targeting swordfish, tuna, or mixed species (mixed in reference to targeting both tunas and swordfish on each set or switching from one target species to a different species within a trip).

Figure 32a. Longline blue marlin CPUE by trip type, 1992-2002.

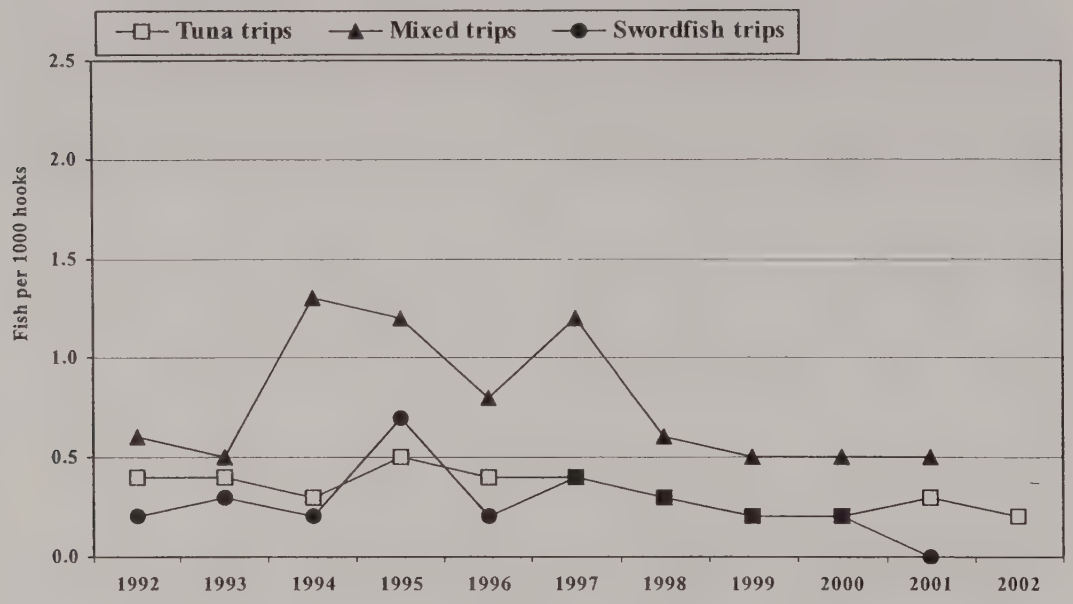
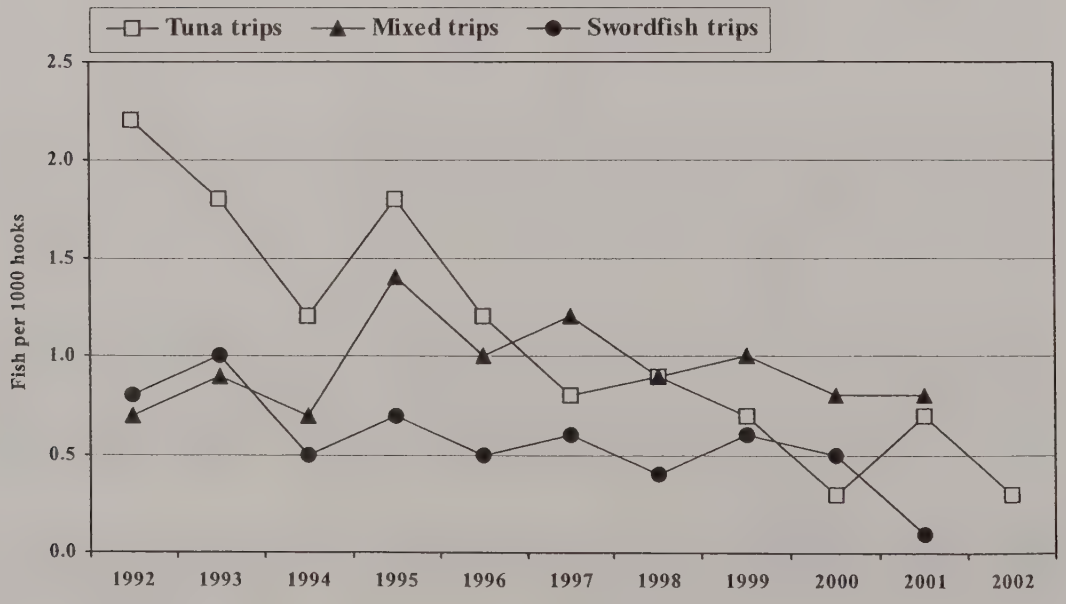


Figure 32b. Longline striped marlin CPUE by trip type, 1992-2002.



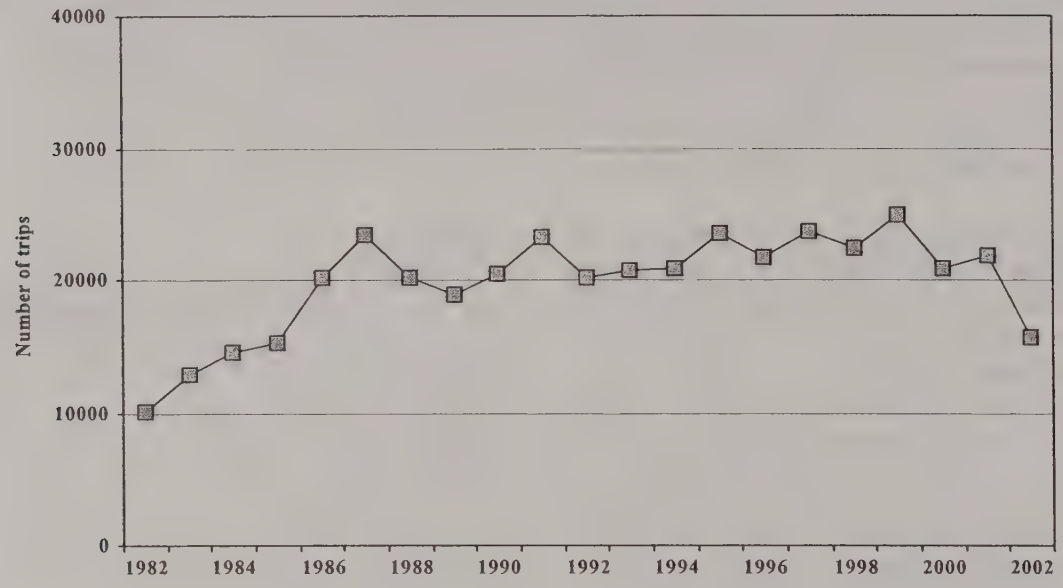
Interpretation: Blue and striped marlin were caught incidentally by the longline fishery. Therfroe, catch rates for these two species were significantly lower than CPUE for target species such as swordfish and bigeye tuna. There were differences in marlin CPUE among trip types. Blue marlin CPUE was noticeably higher on mixed-target trips. The highest blue marlin CPUE on mixed trips occurred between 1994 and 1997; catch rates remained stable at slightly lower lower levels from 1998 thorough 2001. Striped marlin CPUE was usually higher on tuna-target trips and appeared to be on the decline.

Source and Calculation: Longline blue and striped marlin catch rates were compiled from federal daily longline logbooks. CPUE (catch-per-unit-effort) was based on number of fish caught per 1,000 hooks set. Trips were categorized by longline captains or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration. Trips were categorized as targeting swordfish, tuna, or mixed species (mixed in reference to targeting both tunas and swordfish on each set or switching from one target species to a different species within a trip).

Longline marlin CPUE (fish per 1000 hooks) by trip type, 1991-2002.

	Blue marlin			Striped marlin		
Year	Tuna trips	Mixed trips	Swordfish trips	Tuna trips	Mixed trips	Swordfish trips
1991	Poor species identification precluded quantification in 1991					
1992	0.4	0.6	0.2	2.2	0.7	0.8
1993	0.4	0.5	0.3	1.8	0.9	1.0
1994	0.3	1.3	0.2	1.2	0.7	0.5
1995	0.5	1.2	0.7	1.8	1.4	0.7
1996	0.4	0.8	0.2	1.2	1.0	0.5
1997	0.4	1.2	0.4	0.8	1.2	0.6
1998	0.3	0.6	0.3	0.9	0.9	0.4
1999	0.2	0.5	0.2	0.7	1.0	0.6
2000	0.2	0.5	0.2	0.3	0.8	0.5
2001	0.3	0.5	0.0	0.7	0.8	0.1
2002	0.2	---	---	0.3	---	---
Average	**0.3**	**0.8**	**0.3**	**1.1**	**0.9**	**0.6**
SD	**0.1**	**0.3**	**0.2**	**0.6**	**0.2**	**0.2**

Figure 33. Number of Main Hawaiian Islands troll trips, 1982-2002.

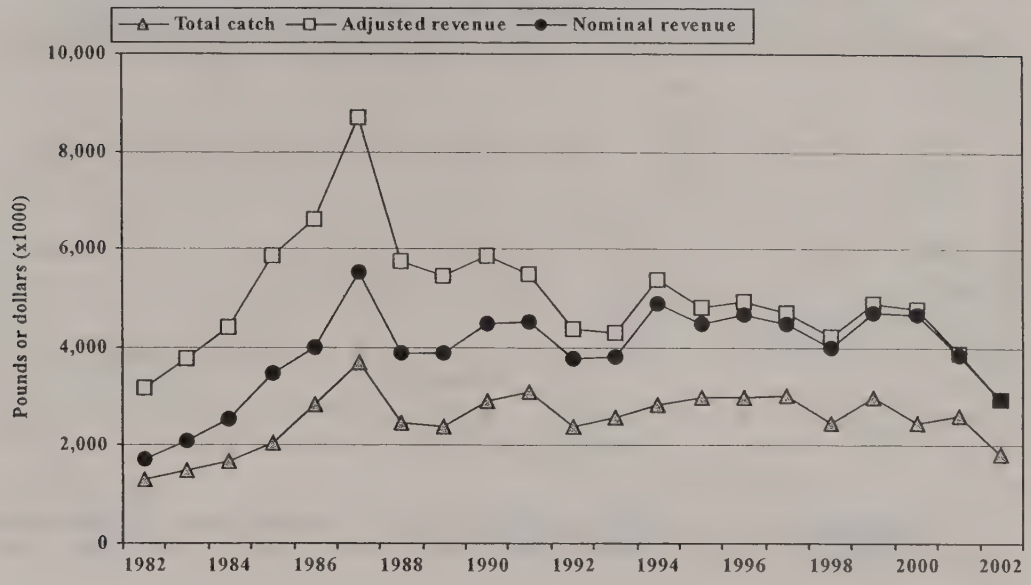


Interpretation: Main Hawaiian Islands (MHI) troll trips more than doubled from 10,000 in 1982 to 23,400 in 1987 and then remained roughly stable until 2001. The reported trip activity then decreased to 15,700 in 2002 (based on preliminary data). However, new commercial fish catch forms were implemented in 2002 and reporting and processing were delayed. Thus, it is unclear how much of the apparent decrease reflects reporting problems, lower troll trip activity, or both.

Source and Calculations: The number of MHI troll trips was compiled from HDAR commercial fish catch reports. MHI troll trips were summarized by counting the unique number of commercial marine license numbers using trolling gear that fished in HDAR statistical areas from 100 to 699 with catches greater than zero (i.e., does not include zero catch trips). The 2001 trip summary was updated with data that became available in 2003.

Year	MHI troll trips
1982	10,039
1983	12,842
1984	14,556
1985	15,291
1986	20,139
1987	23,391
1988	20,202
1989	18,924
1990	20,468
1991	23,184
1992	20,109
1993	20,647
1994	20,905
1995	23,527
1996	21,611
1997	23,674
1998	22,403
1999	24,884
2000	20,855
2001	21,814
2002	15,709
Average	19,770.2
SD	3,912.0

Figure 34. Main Hawaiian Islands troll catch and revenue, 1982-2002.



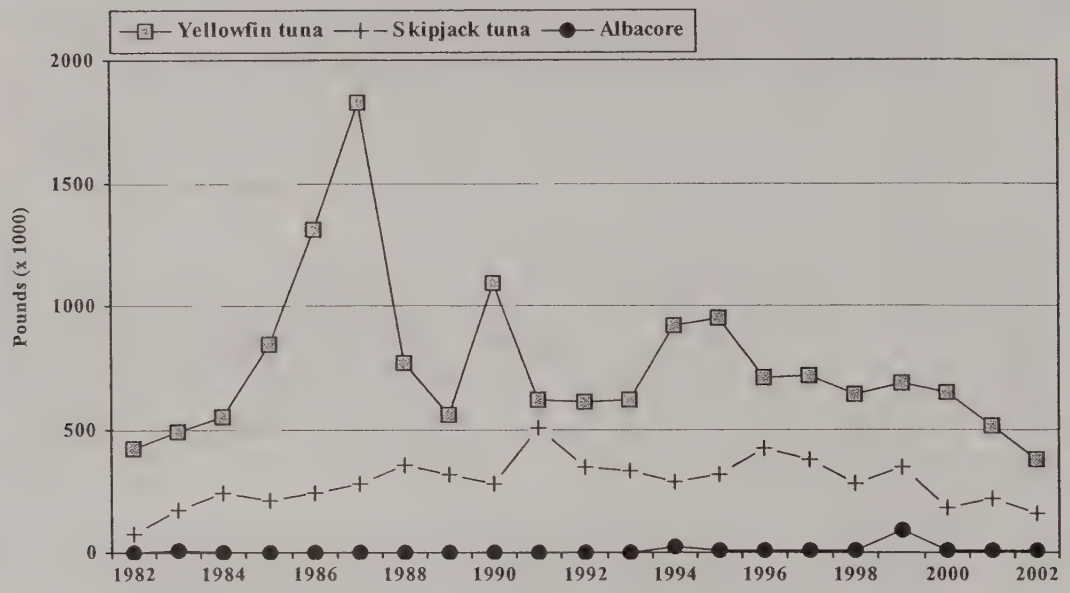
Interpretation: The MHI troll catch grew from 1.3 million pounds in 1982 and peaked at 3.7 million pounds in 1987. Catch decreased to 2.4 million pounds the following year and remained about the same until it dropped below 2 million pounds in 2002.

The pattern for MHI troll ex-vessel revenue was similar to catch; it showed a increase in the early 1980s and peak of $8.7 million in 1987 followed by drop the following year and a long period of stability through 2000. Revenue was at a record of $2.9 million in 2002.

Source and Calculations: MHI troll catch and revenue were summarized from HDAR commercial fish catch reports. Total catch and nominal revenue was summed from the "pounds caught" and "value" fields for trolling gear that fished in fishing in HDAR statistical areas from 100 to 699. The catch and revenue summary for 2002 was compiled with preliminary data and will be updated with final data in next years report.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1982	1,302	$ 3,157	$ 1,702	97.2
1983	1,493	$ 3,786	$ 2,085	99.3
1984	1,675	$ 4,421	$ 2,538	103.5
1985	2,049	$ 5,873	$ 3,479	106.8
1986	2,842	$ 6,607	$ 4,009	109.4
1987	3,709	$ 8,687	$ 5,536	114.9
1988	2,445	$ 5,741	$ 3,875	121.7
1989	2,401	$ 5,462	$ 3,899	128.7
1990	2,901	$ 5,867	$ 4,494	138.1
1991	3,102	$ 5,478	$ 4,497	148.0
1992	2,395	$ 4,373	$ 3,762	155.1
1993	2,578	$ 4,297	$ 3,816	160.1
1994	2,833	$ 5,367	$ 4,897	164.5
1995	2,966	$ 4,795	$ 4,471	168.1
1996	2,994	$ 4,912	$ 4,650	170.7
1997	3,016	$ 4,706	$ 4,487	171.9
1998	2,470	$ 4,217	$ 4,011	171.5
1999	3,002	$ 4,874	$ 4,685	173.3
2000	2,456	$ 4,779	$ 4,673	176.3
2001	2,614	$ 3,885	$ 3,844	178.4
2002	1,837	$ 2,947	$ 2,947	180.3
Average	2,527.7	$4,963.5	$3,921.8	
SD	591.3	$1,248.1	$ 947.0	

Figure 35. Main Hawaiian Islands troll tuna catch, 1982-2002.

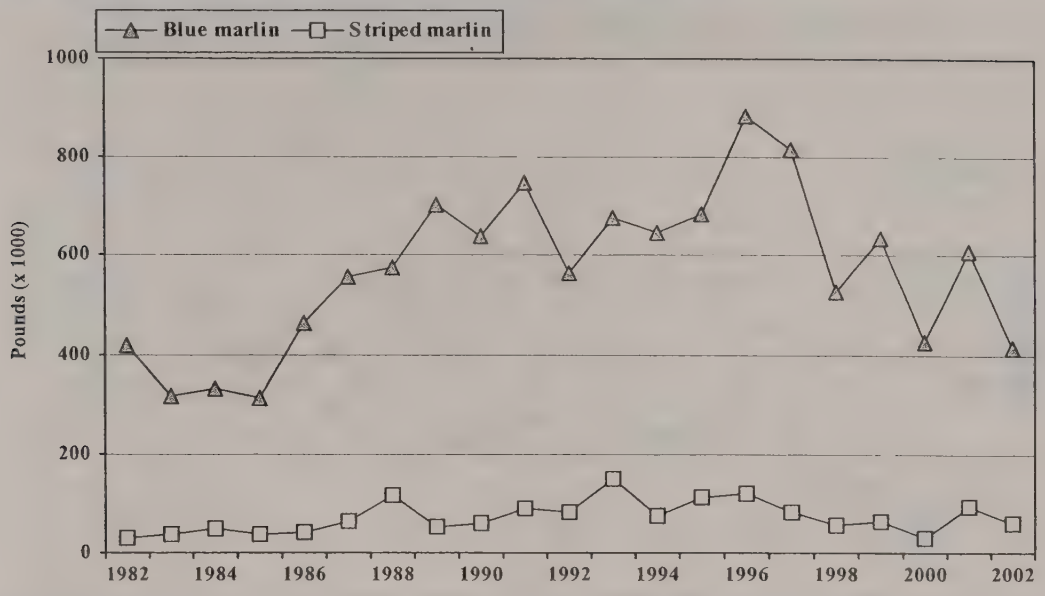


Interpretation: The MHI troll tuna catch was composed predominantly of yellowfin tuna. Yellowfin tuna catch increased dramatically from the early to mid 1980s, dropped in the late 1980s and remained relatively stable to 2000. Yellowfin tuna catches declined modestly in the past two years. Skipjack tuna was the second largest component of the MHI troll catch. Skipjack tuna catches were relatively stable though they have been somewhat lower during the past three years. Small quantities of bigeye tuna, albacore, and other tunas were also caught by this fishery.

Source and Calculations: MHI troll tuna catches were compiled from HDAR commercial catch reports during 1982-2001 and fish dealer reports in 2002. These data reflect catches using trolling gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll tuna catch (1000 pounds)					
Year	Yellowfin tuna	Skipjack tuna	Bigeye tuna	Albacore	Other tunas	Total tuna
1982	421	77	2	3	9	512
1983	492	174	6	6	5	683
1984	547	241	6	4	11	808
1985	844	207	6	1	4	1,062
1986	1,308	241	10	0	8	1,567
1987	1,828	277	11	1	19	2,136
1988	764	351	10	1	16	1,141
1989	559	318	11	1	14	904
1990	1,089	278	15	1	18	1,401
1991	615	504	11	2	13	1,145
1992	606	347	9	3	15	980
1993	616	332	4	3	9	964
1994	914	283	6	22	15	1,263
1995	949	318	10	10	9	1,295
1996	707	424	4	5	6	1,146
1997	712	376	6	7	6	1,107
1998	636	278	5	4	10	933
1999	687	347	7	87	7	1,124
2000	649	181	6	4	6	845
2001	514	216	9	10	5	754
2002	375	158	14	5	3	554
Average	753.9	282.3	8.0	8.5	9.9	1,063.1
SD	331.7	97.1	3.4	18.6	4.8	361.5

Figure 36. Main Hawaiian Islands troll billfish catch, 1982-2002.

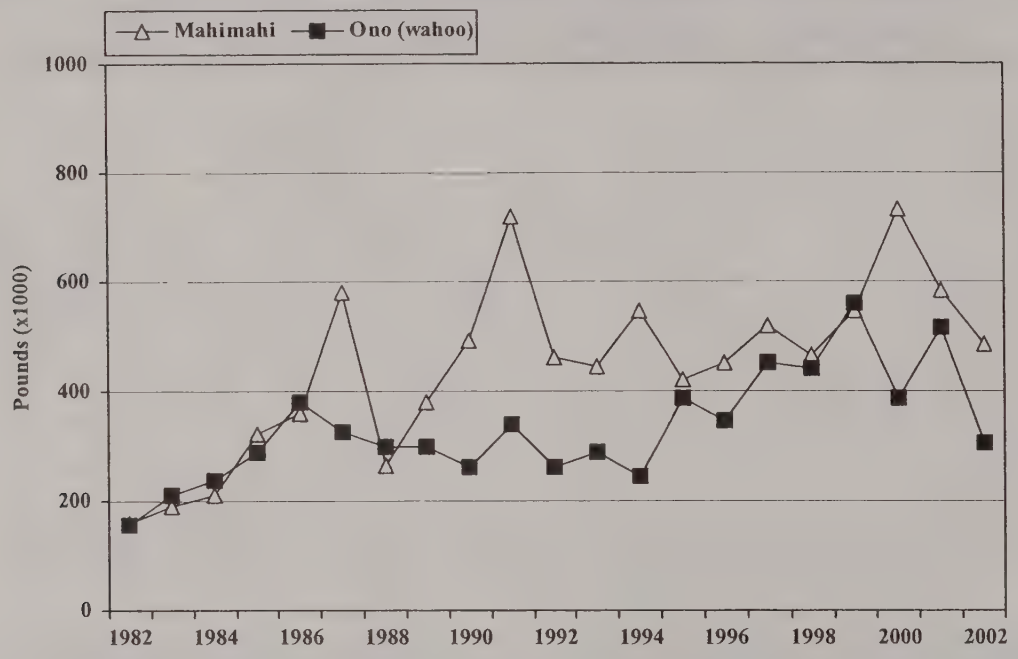


Interpretation: MHI troll catch for billfish was composed primarily of blue marlin. Blue marlin catches increased from 300 thousand pounds in the early 1980s to approximately 900 thousand pounds in 1996 and varied substantially thereafter. In contrast to the longline fishery, the striped marlin catch in this fishery was quite low. The MHI troll fishery also had small catches of other billfish, e.g., including short-nosed spearfish, sailfish, and swordfish.

Source and Calculations: MHI troll billfish catches were compiled from HDAR commercial catch reports during 1982-2001 and fish dealer reports in 2002. These data reflect catches using trolling gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll billfish catch (1000 pounds)				
Year	Blue marlin	Striped marlin	Other billfish	Swordfish	Total billfish
1982	418	30	24	2	474
1983	314	36	53	1	404
1984	332	51	34	1	418
1985	311	39	24	1	375
1986	463	40	29	0	533
1987	557	66	42	1	666
1988	575	118	41	2	736
1989	704	52	47	2	805
1990	638	59	33	1	732
1991	749	89	52	1	890
1992	565	83	35	0	683
1993	675	150	44	0	870
1994	648	76	46	1	770
1995	684	114	57	1	856
1996	885	119	37	1	1,042
1997	814	83	36	1	935
1998	527	57	41	1	626
1999	635	62	71	1	769
2000	423	30	34	1	489
2001	610	94	51	1	756
2002	412	59	18	1	491
Average	568.7	71.8	40.4	1.1	681.9
SD	161.5	33.0	12.3	0.5	190.8

Figure 37. Main Hawaiian Islands troll catch of other pelagic PMUS, 1982-2002.

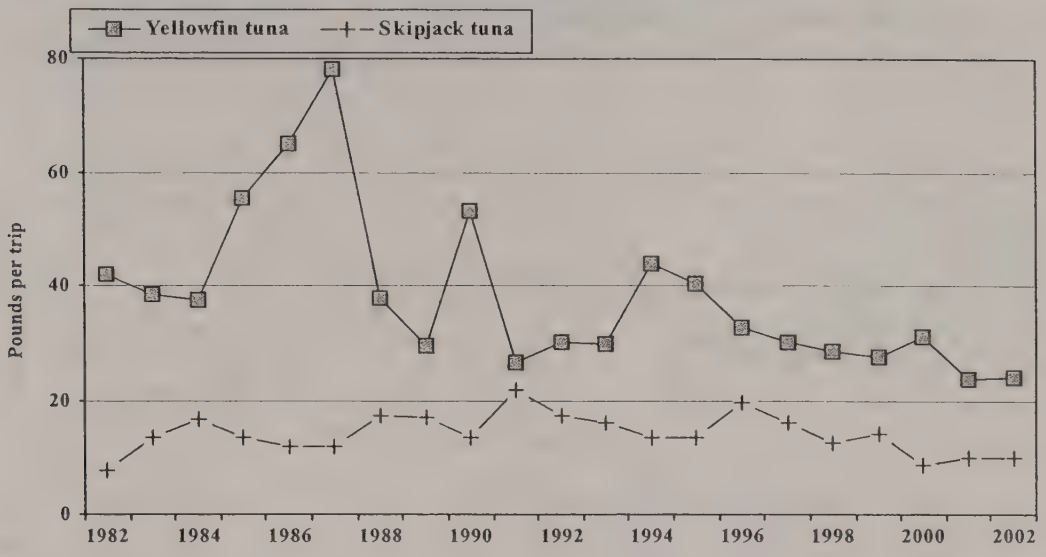


Interpretation: Mahimahi and ono comprised most of the MHI troll catch of other PMUS. Mahimahi catches were usually higher than those for ono. Mahimahi catch peaked at 700 thousand pounds in 2000 while ono catch peaked near 600 thousand pounds in 1999. Catch for both species seemed to be on a gradually increasing trend over the 20-year period.

Source and Calculations: MHI troll catches of other PMUS were compiled from HDAR commercial catch reports during 1982-2001 and fish dealer reports in 2002. These data reflect catches using trolling gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll other pelagics catch (1000 pounds)			
Year	Mahimahi	Ono (wahoo)	Misc pelagics	Total other pelagic
1982	160	154	3	317
1983	191	210	5	406
1984	210	236	2	449
1985	323	287	2	612
1986	358	381	3	742
1987	579	324	3	907
1988	264	298	6	569
1989	379	298	14	691
1990	491	262	16	768
1991	718	337	12	1,067
1992	461	262	8	731
1993	444	286	13	744
1994	546	245	9	800
1995	419	388	8	815
1996	451	347	7	806
1997	517	451	5	974
1998	464	442	6	912
1999	545	558	6	1,109
2000	731	387	5	1,122
2001	584	516	4	1,104
2002	484	306	2	792
Average	443.8	332.3	6.6	782.7
SD	155.5	100.1	4.1	227.6

Figure 38. Main Hawaiian Islands troll tuna catch per trip, 1982-2002.

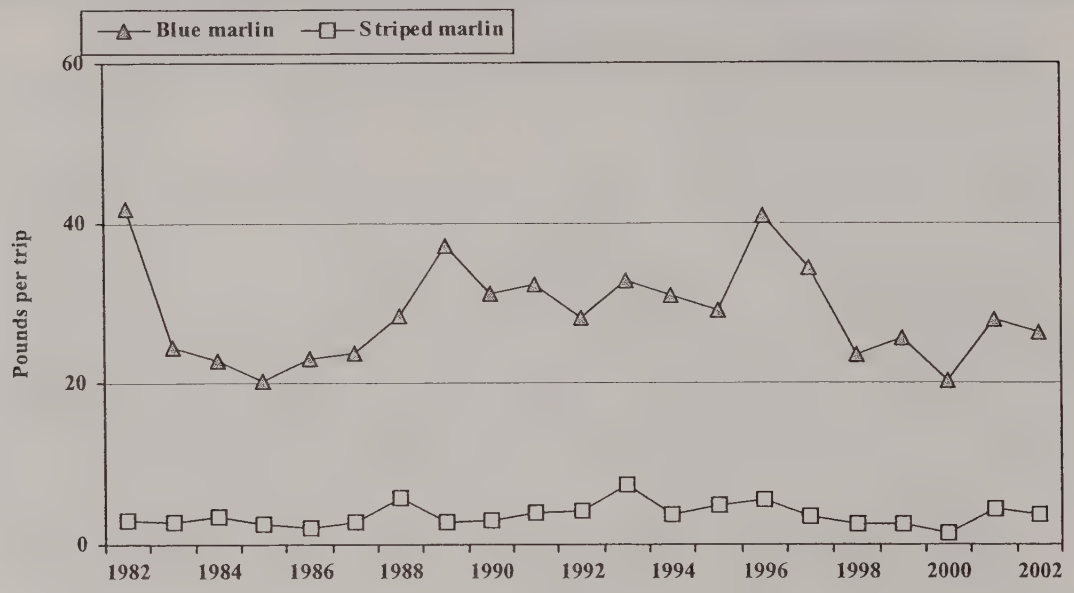


Interpretation: MHI troll yellowfin tuna CPUE peaked near 80 pounds in 1987 and trended downward thereafter. Yellowfin tuna CPUE was 24 pounds in 2002. Skipjack tuna CPUE was relatively stable over the 20-year period with CPUE at 10 pounds in 2002.

Source and Calculations: MHI troll tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1987-2001 and fish dealer reports in 2002. These data reflect only trolling gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes from 100 to 699. These catches were then divided by the number of MHI troll trips. The number of trips do not include zero catch trips.

	MHI troll tuna CPUE (pounds per trip)	
Year	Yellowfin tuna	Skipjack tuna
1982	42	8
1983	38	14
1984	38	17
1985	55	14
1986	65	12
1987	78	12
1988	38	17
1989	30	17
1990	53	14
1991	27	22
1992	30	17
1993	30	16
1994	44	14
1995	40	14
1996	33	20
1997	30	16
1998	28	12
1999	28	14
2000	31	9
2001	24	10
2002	24	10
Average	38.3	14.1
SD	14.1	3.5

Figure 39. Main Hawaiian Island troll marlin catch per trip, 1982-2002.

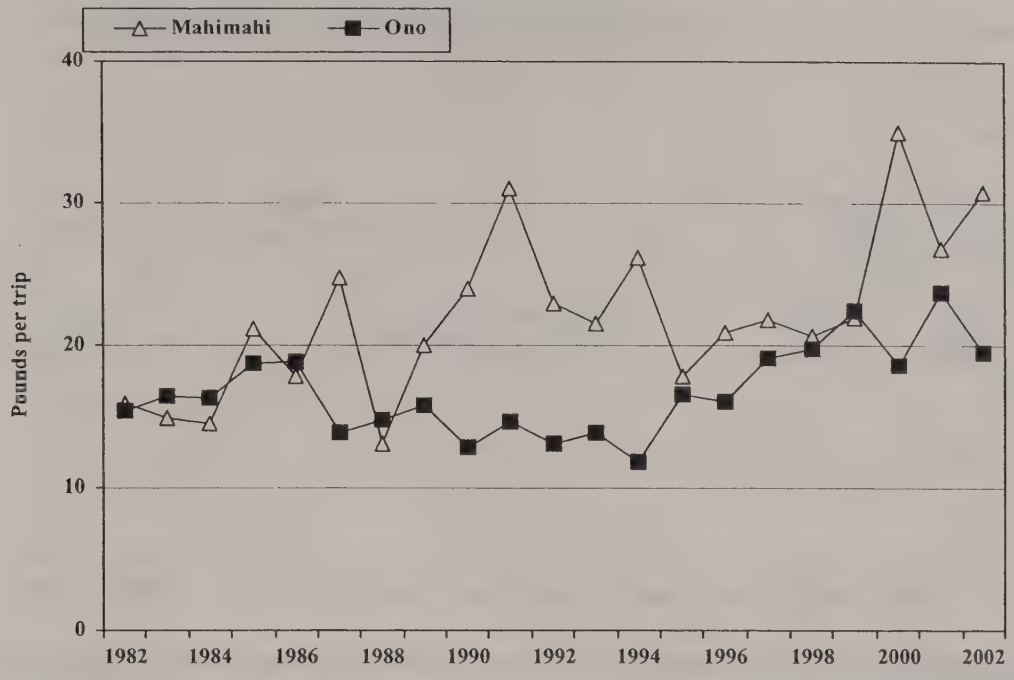


Interpretation: Blue marlin CPUE peaked in 1982, 1989, and 1996 when catch rates were near or slightly above 40 pounds. CPUE for blue marlin appeared to be stable over the 20-year period. Striped marlin CPUE was substantially lower and peaked at only 7 pounds in 1993. CPUE for striped marlin also seemed to be stable.

Source and Calculations: MHI troll marlin CPUE was measured as pounds of marlin caught per trip. Marlin catches were compiled from HDAR commercial catch reports during 1987-2001 and fish dealer reports in 2002. These data reflect only trolling gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes of less than 1000. These catches were then divided by the number of MHI troll trips. The number of trips do not include zero catch trips.

	MHI troll marlin CPUE (pounds per trip)	
Year	Blue marlin	Striped marlin
1982	42	3
1983	24	3
1984	23	3
1985	20	3
1986	23	2
1987	24	3
1988	28	6
1989	37	3
1990	31	3
1991	32	4
1992	28	4
1993	33	7
1994	31	4
1995	29	5
1996	41	6
1997	34	3
1998	24	3
1999	26	3
2000	20	1
2001	28	4
2002	26	4
Average	28.8	3.6
SD	6.2	1.4

Figure 40. Main Hawaiian Island troll mahimahi and ono catch per trip, 1982-2002.

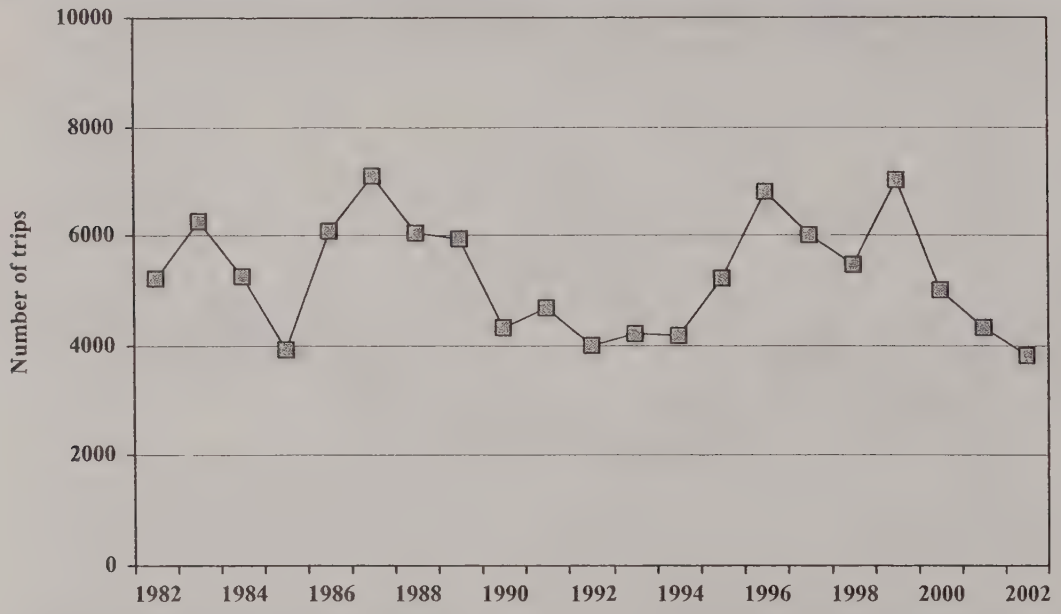


Interpretation: Mahimahi CPUE was usually higher and more variable than that for ono. Mahimahi CPUE peaked at 35 pounds in 2000 while ono CPUE was highest at 24 pounds in 2001. CPUE for both species were on a upward trend from the mid-1990s.

Source and Calculations: MHI troll mahimahi and ono CPUE was measured as pounds caught per trip. Mahimahi and ono catches were compiled from HDAR commercial catch reports during 1987-2001 and fish dealer reports in 2002. These data reflect only trolling gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes of less than 1000. These catches were then divided by the number of MHI troll trips. The number of trips do not include zero catch trips.

MHI troll mahimahi and ono catch per trip (pounds)		
Year	Mahimahi	Ono
1982	16	15
1983	15	16
1984	14	16
1985	21	19
1986	18	19
1987	25	14
1988	13	15
1989	20	16
1990	24	13
1991	31	15
1992	23	13
1993	22	14
1994	26	12
1995	18	16
1996	21	16
1997	22	19
1998	21	20
1999	22	22
2000	35	19
2001	27	24
2002	31	19
Average	22.1	16.7
SD	5.7	3.1

Figure 41. Number of Main Hawaiian Islands handline trips, 1982-2002.

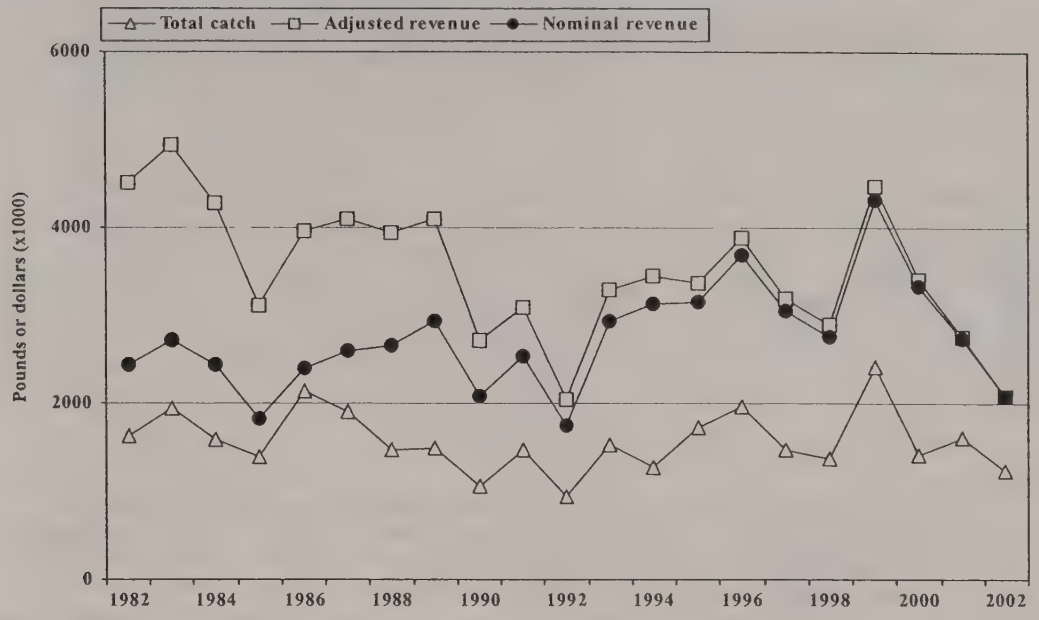


Interpretation: The number of Main Hawaiian Islands (MHI) handline trips ranged from 7,100 in 1987 to 3,800 in 2002. The 2002 trips summary was based on preliminary data. Although handline trip activity varied substantially, there was no clear long-term trend. New commercial fish catch forms were implemented in 2002 and reporting and processing were delayed. Thus, it is unclear how much of the apparent decrease in 2002 reflects reporting problems, lower trip activity, or both.

Source and Calculations: The number of MHI handline trips were compiled from HDAR commercial fish catch reports. MHI handline trips were summarized by counting unique commercial marine license number and date combinations, when catches were greater than zero (i.e., this excludes zero catch trips). Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the trip summary does not include zero catch trips. The 2001 trip summary was updated with data that became available in 2003.

Year	MHI handline trips
1982	5,219
1983	6,275
1984	5,248
1985	3,929
1986	6,087
1987	7,069
1988	6,032
1989	5,947
1990	4,300
1991	4,688
1992	3,981
1993	4,209
1994	4,157
1995	5,230
1996	6,801
1997	6,010
1998	5,481
1999	7,004
2000	4,985
2001	4,307
2002	3,819
Average	5,275.1
SD	1,051.6

Figure 42. Main Hawaiian Island handline catch and revenue, 1982-2002.



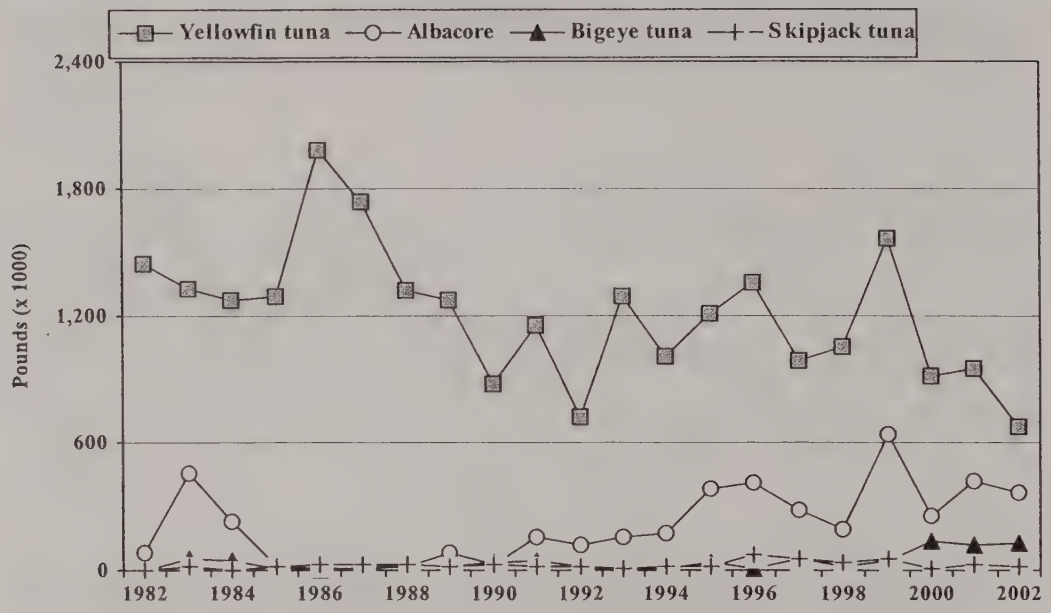
Interpretation: The MHI handline total ranged from 950,000 pounds in 1992 to 2.4 million pounds in 1999. Although handline catches varied substantially, it seemed to be stable over the 20-year period. Handline catch decreased 22% to 1.2 million pounds in 2002.

The MHI handline ex-vessel revenue trended downward from $4.9 million in 1984 to $2.0 million in 1992, rose suddenly the following year. Revenue increased to $4.5 million in 1999 then dropped more than 50% in 2002.

Source and Calculations: MHI handline catch and revenue was summarized from HDAR commercial fish catch reports. Total catch and nominal revenue was summed from the "pounds caught" and "value" fields, respectively. The catch and revenue summary for 2002 was compiled with preliminary data and will be updated with final data in next years report.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1982	1,638	$ 4,511	$ 2,432	97.2
1983	1,949	$ 4,944	$ 2,723	99.3
1984	1,591	$ 4,266	$ 2,449	103.5
1985	1,391	$ 3,100	$ 1,836	106.8
1986	2,136	$ 3,954	$ 2,399	109.4
1987	1,914	$ 4,089	$ 2,606	114.9
1988	1,471	$ 3,932	$ 2,654	121.7
1989	1,487	$ 4,094	$ 2,922	128.7
1990	1,060	$ 2,721	$ 2,084	138.1
1991	1,477	$ 3,085	$ 2,532	148.0
1992	946	$ 2,039	$ 1,754	155.1
1993	1,532	$ 3,293	$ 2,924	160.1
1994	1,287	$ 3,436	$ 3,135	164.5
1995	1,733	$ 3,367	$ 3,139	168.1
1996	1,962	$ 3,875	$ 3,669	170.7
1997	1,479	$ 3,193	$ 3,044	171.9
1998	1,368	$ 2,901	$ 2,759	171.5
1999	2,414	$ 4,475	$ 4,301	173.3
2000	1,412	$ 3,395	$ 3,320	176.3
2001	1,604	$ 2,761	$ 2,732	178.4
2002	1,249	$ 2,085	$ 2,085	180.3
Average	1,576.3	$3,500.7	$2,738.0	
SD	349.8	$ 775.6	$ 596.9	

Figure 43. Main Hawaiian Island handline tuna catch, 1982-2002.

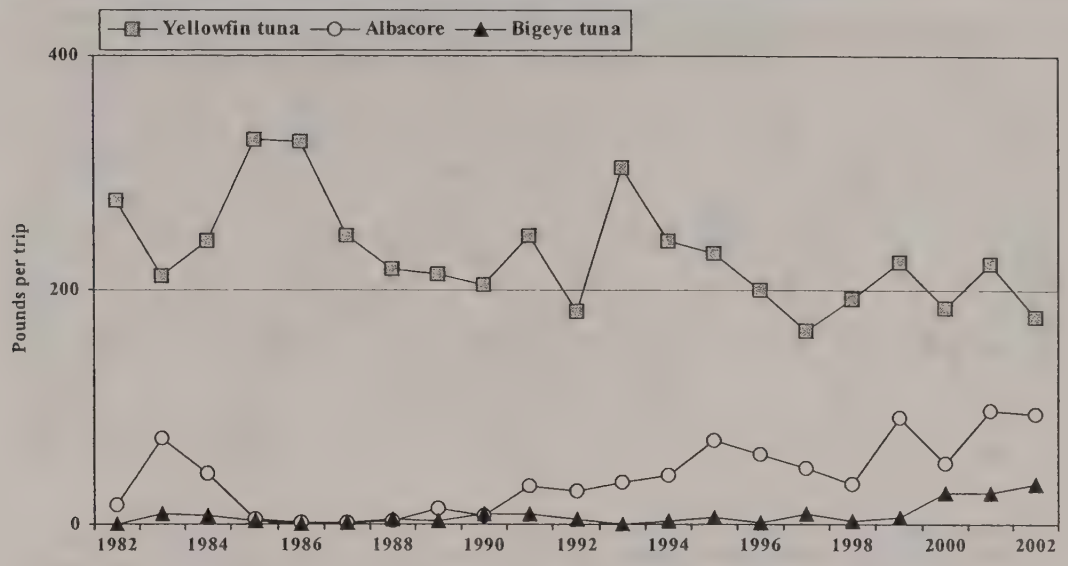


Interpretation: Yellowfin tuna was the dominant component of the MHI handline catch with the peak catch at 2 million pounds in 1986. Albacore catch peaked at 630 thousand pounds in 1999 while bigeye tuna catch was a record 390 thousand pounds in 2002. In general, annual yellowfin tuna catches were lower (typically below 1.2 million pounds) in the 1990s while albacore and bigeye tuna catches increased. Small catches of billfish, mahimahi, and ono by the handline fishery represented about 5% of the total catch.

Source and Calculations: MHI handline tuna catches were compiled from HDAR commercial catch reports during 1982-2001 and fish dealer reports in 2002. These data reflect catches using handline gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI handline tuna catch (1000 lbs)					
Year	Yellowfin tuna	Albacore	Bigeye tuna	Skipjack tuna	Other tunas	Total
1982	1,438	83	0	3	16	1,540
1983	1,323	457	59	14	26	1,879
1984	1,264	230	42	2	2	1,540
1985	1,287	15	11	16	1	1,330
1986	1,984	11	2	24	1	2,023
1987	1,734	12	6	25	5	1,782
1988	1,310	18	28	29	9	1,395
1989	1,266	78	19	20	11	1,393
1990	876	31	41	26	7	981
1991	1,154	157	45	19	6	1,380
1992	722	116	19	21	7	885
1993	1,283	154	2	14	5	1,458
1994	1,003	176	10	21	3	1,213
1995	1,207	380	33	17	6	1,642
1996	1,352	409	11	69	4	1,845
1997	986	287	52	56	3	1,384
1998	1,052	191	15	38	3	1,298
1999	1,559	642	46	52	2	2,302
2000	916	260	133	13	2	1,324
2001	952	417	117	28	3	1,518
2002	676	361	131	18	2	1,187
Average	1,206.9	213.6	39.1	25.0	5.9	1,490.4
SD	317.5	177.0	40.8	16.7	5.9	336.4

Figure 44. Main Hawaiian Island handline tuna catch per trip, 1982-2002.

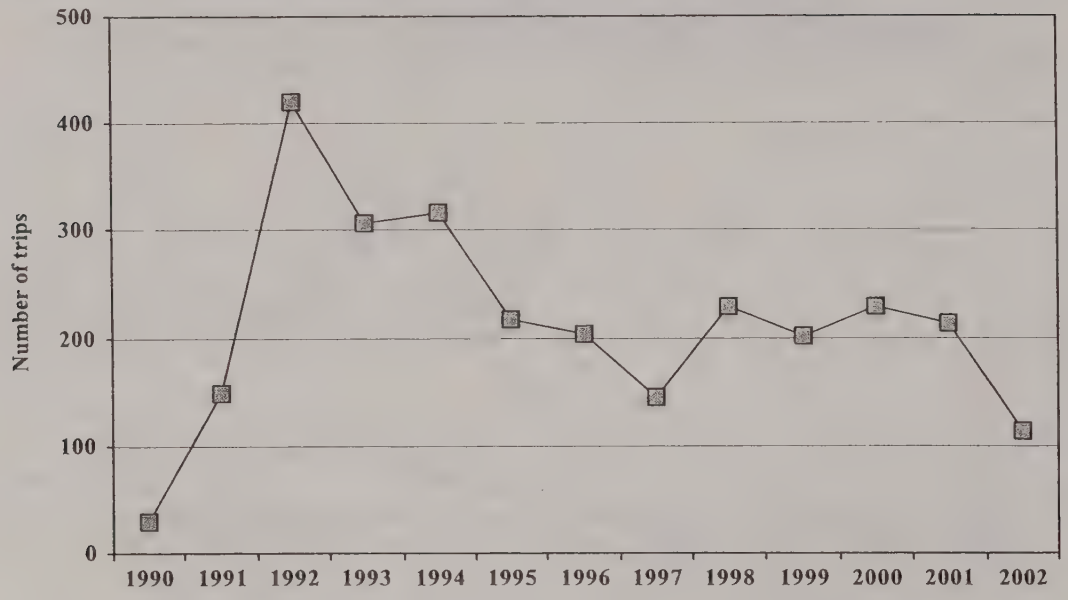


Interpretation: MHI handline yellowfin tuna CPUE was about 200 pounds per trip and spiked above 300 pounds on three occasions (1985, 1986, and 1993) over the 20-year period. Yellowfin tuna CPUE fluctuated but exhibited no obvious trend. Albacore CPUE was 95 pounds; close to its record attained last year. Bigeye tuna CPUE was at a record 34 pounds in 2002. Albacore and bigeye tuna have shown a general increase from 1998.

Source and Calculations: MHI handline tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1987-2001 and fish dealer reports in 2002. These data reflect only handline gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes from 100 to 699. These catches were then divided by the number of MHI handline trips. Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the CPUE does not include zero catch trips.

	MHI handline catch per trip (pounds)			
Year	Yellowfin tuna	Albacore	Bigeye tuna	Total
1982	276	16	0	314
1983	211	73	9	311
1984	241	44	8	303
1985	328	4	3	354
1986	326	2	0	351
1987	245	2	1	271
1988	217	3	5	244
1989	213	13	3	250
1990	204	7	9	246
1991	246	33	10	315
1992	181	29	5	238
1993	305	37	1	364
1994	241	42	2	310
1995	231	73	6	331
1996	199	60	2	289
1997	164	48	9	246
1998	192	35	3	250
1999	223	92	7	345
2000	184	52	27	283
2001	221	97	27	372
2002	177	95	34	327
Average	229.7	40.7	8.1	300.6
SD	46.3	31.5	9.5	43.8

Figure 45. Number of offshore tuna handline trips, 1990-2002.

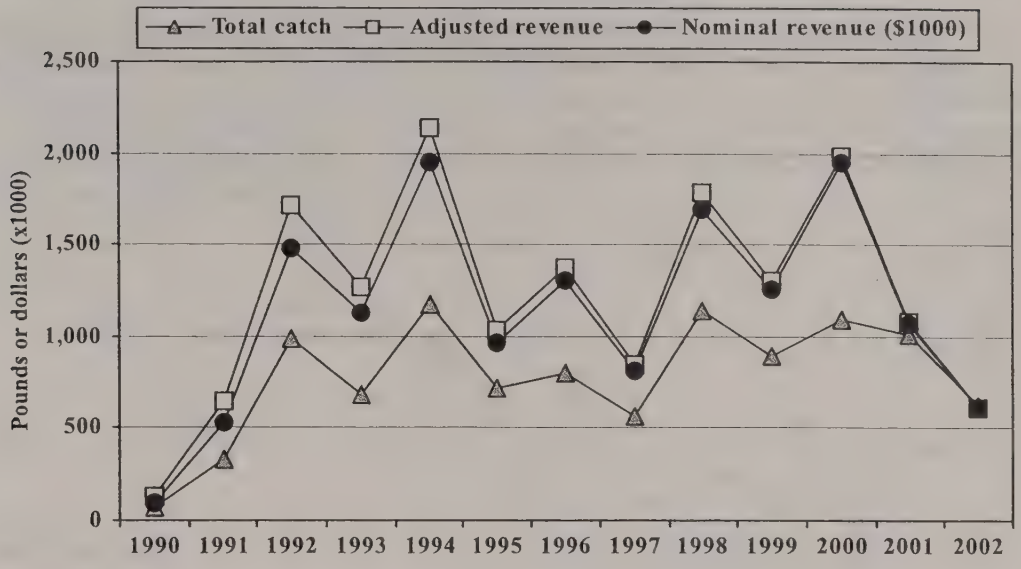


Interpretation: The offshore tuna handline fishery made 114 trips in 2002, a 50% decrease from the previous year. Trips by offshore tuna handline vessels peaked in 1992 and remained at about 200 trips from 1995 with dips in effort in 1997 and 2002. Reporting and processing the offshore handline data was delayed due to the implementation of new commercial fish report forms in 2002.

Source and Calculation: The number of offshore handline trips were compiled from HDAR commercial fish catch reports. Offshore handline trips were summarized by counting unique commercial marine license number and date combinations, when catches were greater than zero (i.e., this excludes zero catch trips). Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the trip summary does not include zero catch trips. In addition to the above set of conditions, the HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other offshore areas were selected out for this fishery. The number of trips for 2001 was updated with data which became available in 2003.

Year	Offshore handline trips
1990	29
1991	148
1992	420
1993	307
1994	316
1995	216
1996	204
1997	145
1998	228
1999	202
2000	228
2001	212
2002	114
Average	213.0
SD	98.1

Figure 46. Offshore tuna handline catch and revenue, 1990-2002.

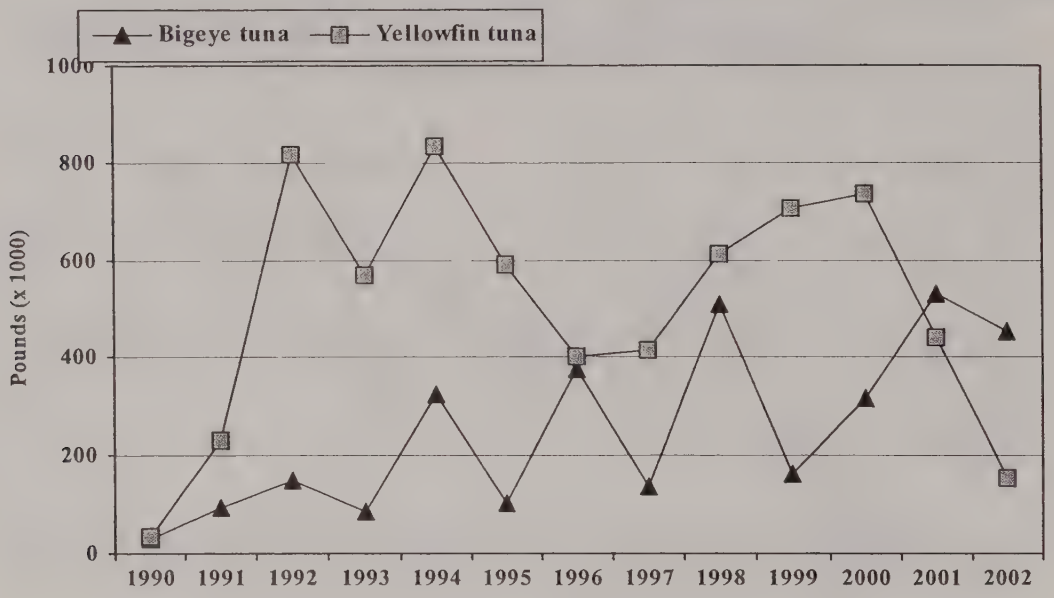


Interpretation: The preliminary offshore handline fishery catch and revenue was 621 thousand pounds worth $610 thousand in 2002, down 38% and 44% from 2001. Catch and revenue grew rapidly in the early 1990s. Though there was substantial year to year variation, catch and revenue exhibited no apparent trend during the past decade. Reporting and processing the offshore handline data was delayed due to the implementation of new HDAR commercial catch report forms in 2002.

Source and Calculation: Offshore handline catch and revenue was summarized from HDAR commercial fish catch reports. Total catch and nominal revenue was summed from the "pounds caught" and "value" fields, respectively. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other offshore areas. The Honolulu CPI was applied to nominal revenue to derive inflation-adjusted revenue. The catch and revenue summaries for 2001 was updated with data which became available in 2003.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1990	66	$ 127	$ 97	138.1
1991	331	$ 649	$ 533	148.0
1992	987	$ 1,717	$ 1,477	155.1
1993	679	$ 1,267	$ 1,125	160.1
1994	1,175	$ 2,134	$ 1,947	164.5
1995	714	$ 1,034	$ 964	168.1
1996	793	$ 1,375	$ 1,302	170.7
1997	563	$ 851	$ 811	171.9
1998	1,134	$ 1,783	$ 1,696	171.5
1999	888	$ 1,307	$ 1,256	173.3
2000	1,096	$ 1,988	$ 1,944	176.3
2001	1,007	$ 1,080	$ 1,069	178.4
2002	621	$ 610	$ 610	180.3
Average	773.3	$1,224.8	$1,140.8	
SD	327.3	$ 585.0	$ 550.9	

Figure 47. Offshore tuna handline catch, 1990-2002.



Interpretation: Bigeye tuna catch was the largest component of the offshore handline catch (73%) followed by yellowfin tuna (25%), and small catches of mahimahi. Yellowfin tuna was the largest component of the catch until 2001 when it was replaced by bigeye tuna. In general, bigeye tuna catch has been on a increasing trend. This may reflect better species identification by fishermen (small bigeye tuna and yellowfin tuna can be very difficult to distiguish). There were small catches of mahimahi also.

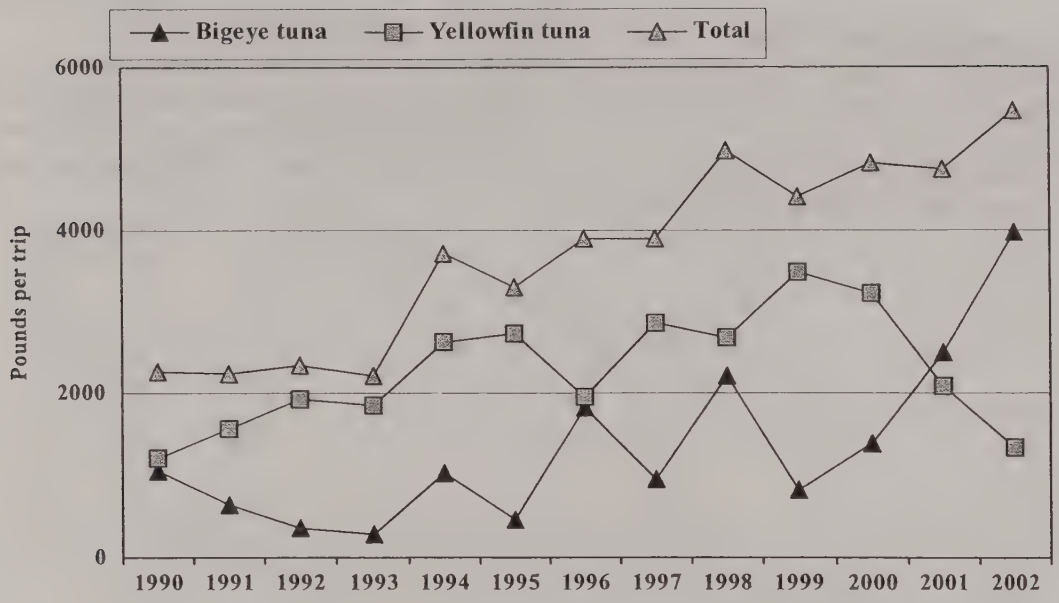
Most of the tunas caught by the offshore handline fishery are smaller than the inshore handline fishery. The reported yellowfin tuna catch may actually be bigeye tuna; knowledgeable observers have reported that the small tunas caught by this fishery (up to 70%) are predominantly bigeye tuna (David Itano, pers. comm.). As standard practice, tuna catch reported by fishermen as "ahi" are coded by the HDAR Fisheries Statistics Unit as yellowfin tuna. Though these tunas may indeed be bigeye tuna, the Statistics Unit must record the species as reported by fishermen unless they have evidence or confirmation to make changes to the data. Therefore, the total tuna catch by the offshore handline fishery may be more accurate than the catch for individual species. HDAR is making an effort to help educate fishermen and fish dealers correctly ID small

	Offshore handline catch (1000 pounds)			
Year	Bigeye tuna	Yellowfin tuna	Mahimahi	Total
1990	31	35	0	66
1991	94	232	5	331
1992	151	816	21	987
1993	85	571	23	679
1994	324	834	18	1,175
1995	102	591	20	714
1996	375	401	17	793
1997	138	415	9	563
1998	508	613	13	1,134
1999	164	703	20	888
2000	317	734	46	1,096
2001	530	442	36	1,007
2002	452	153	15	621
Average	251.5	503.1	18.7	773.3
SD	173.8	251.8	12.1	327.3

tunas. There was no catch reported from this fishery prior to 1990.

Source and Calculation: Offshore handline tuna catches were compiled from HDAR commercial catch reports during 1982-2001 and fish dealer reports in 2002. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other HDAR offshore statistical areas. The catch summary for 2001 was updated with data which became available in 2003.

Figure 48. Offshore tuna handline catch per trip, 1990-2002.



Interpretation: Catch per trip was the unit of measurement for offshore handline CPUE. This was based on multi-day trips. CPUE for the offshore handline fishery was up 15% in 2002 and has increased more than two-fold from 1990. Generally, catch rates for both bigeye and yellowfin tunas increased though the 1990s. Bigeye tuna CPUE increased almost 5-fold from 1999 to 2002 while yellowfin tuna CPUE decreased 60% during the same time.

Source and Calculation: Offshore handline tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1990-2001 and fish dealer reports in 2002. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other HDAR offshore statistical areas. These catches were then divided by the number of offshore handline trips. Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the CPUE does not include zero catch trips.

	Offshore handline catch per trip (pounds)			
Year	Bigeye tuna	Yellowfin tuna	Mahimahi	Total
1990	1,052	1,217	2	2,271
1991	634	1,569	31	2,234
1992	359	1,942	49	2,350
1993	276	1,858	76	2,210
1994	1,024	2,638	56	3,718
1995	473	2,738	94	3,305
1996	1,840	1,966	82	3,888
1997	954	2,862	65	3,881
1998	2,227	2,688	57	4,972
1999	814	3,482	101	4,397
2000	1,388	3,218	201	4,808
2001	2,498	2,084	169	4,751
2002	3,968	1,346	132	5,446
Average	1,346.7	2,277.5	85.9	3,710.2
SD	1,050.4	713.3	55.1	1,152.5

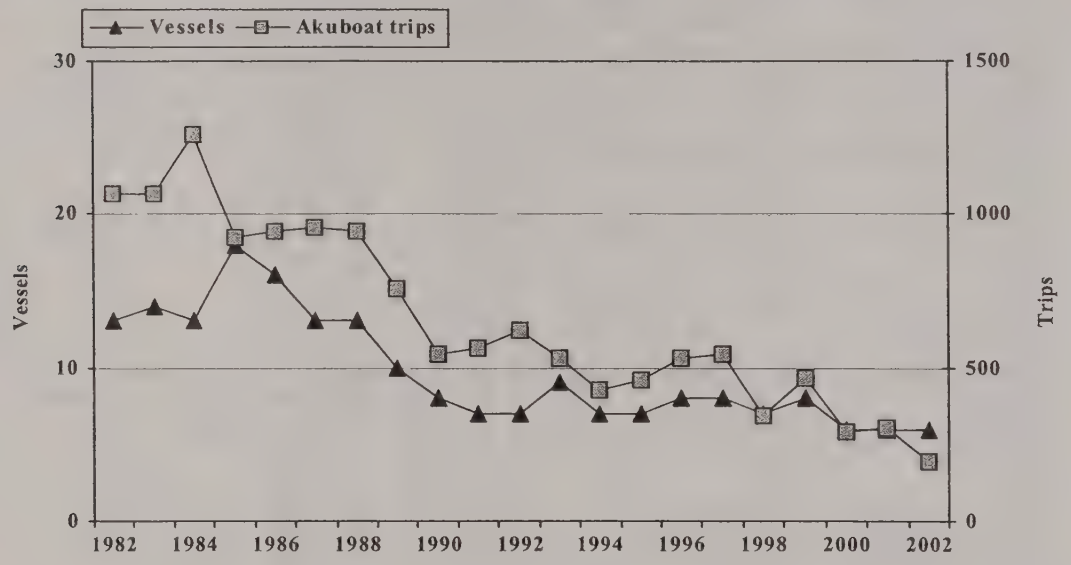
Table 8. Average weight by species for troll and handline catch, 1987-2002.

SPECIES	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average	S.D.
TUNAS																		
Albacore	33	64	55	58	53	53	55	53	22	42	40	21	48	47	47	45	46.0	12.1
Bigeye tuna	14	34	24	25	29	28	22	30	18	24	19	21	24	25	21	30	24.3	5.1
Skipjack tuna	7	7	11	7	9	6	7	9	7	12	11	5	7	7	8	7	7.9	1.9
Yellowfin tuna	32	32	44	41	34	27	44	37	30	42	34	28	31	43	34	39	35.8	5.8
BILLFISH																		
Blue marlin	215	181	188	248	197	215	182	233	204	195	175	201	211	244	188	232	206.8	22.8
Striped marlin	66	64	68	76	63	70	67	67	61	65	68	58	55	53	51	60	63.3	6.6
Swordfish	126	124	107	97	122	75	139	95	110	86	96	85	88	91	100	108	103.1	17.6
OTHER PMUS																		
Mahimahi	21	18	21	20	15	14	14	14	16	16	16	18	18	15	16	16	16.8	2.4
Ono (wahoo)	24	25	25	25	23	26	24	27	24	23	21	25	27	26	24	26	24.7	1.6

Interpretation: Average weight for all of the species caught by troll and handline gear in 2002 were close to their respective 15-year averages. The average weight was a little higher for bigeye and yellowfin tuna while albacore and skipjack tuna remained about the same. Blue marlin average weight increased the most of all species in 2002 (44 pounds) while striped marlin and swordfish had more modest increase in average weights. Mahimahi and ono were very close to the long-term average.

Source and Calculations: The average weights were calculated from HDAR commercial catch reports. Total pounds caught was divided by the total number caught when number of fish caught was greater than zero. Catch by the troll and handline fishery is usually landed whole, however, average weight calculations were based on reported weight and may include catch that was processed, i.e., headed and gutted, gilled and gutted.

Figure 49. Hawaii aku boat (pole and line) vessel and trip activity, 1982-2002.

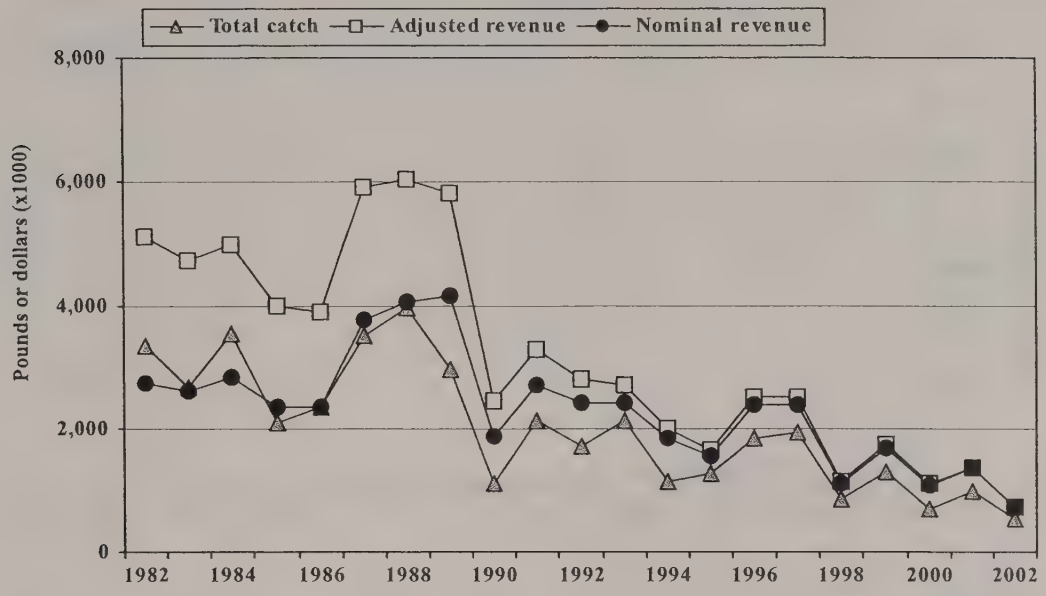


Interpretation: There were six aku boat vessels fishing in 2002. The participation in this fleet has remained relatively stable from 1990 but has been lower than in the 1980s. The number of aku boat trips during 1982-2002 follows the same pattern as vessel participation with a steep declined from 1982 to 1990 followed by a gradual decrease since 2000. The steep decline of the 1980s can be attributed partly to the closure of the tuna cannery. Attrition of vessels, many which were built in the 1940s, and poor skipjack tuna catches are other reasons for the long-term decline in this fishery. Preliminary data show a 6 verssels made a record low 195 trips in 2002. Reporting and processing 2002 data have been slow because fishermen and HDAR staff have begun using a new, more detailed, but unfamiliar aku boat catch form. Thus, it is unclear how much of the apparent decrease in aku boat trips reflects reporting problems, lower trip activity, or both.

Source and Calculations: The aku boat trip summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. A unique combination of license number, month, day, and year was used to define an aku boat trip. Zero catch trips from the aku boat fish report data were included in this summary.

Year	Vessels	Akuboat trips
1982	13	1,069
1983	14	1,070
1984	13	1,264
1985	18	927
1986	16	943
1987	13	958
1988	13	945
1989	10	757
1990	8	541
1991	7	561
1992	7	621
1993	9	528
1994	7	425
1995	7	460
1996	8	530
1997	8	540
1998	7	341
1999	8	466
2000	6	290
2001	6	301
2002	6	195
Average	9.7	653.9
SD	3.6	301.8

Figure 50. Hawaii aku boat (pole and line) catch and revenue, 1982-2002.

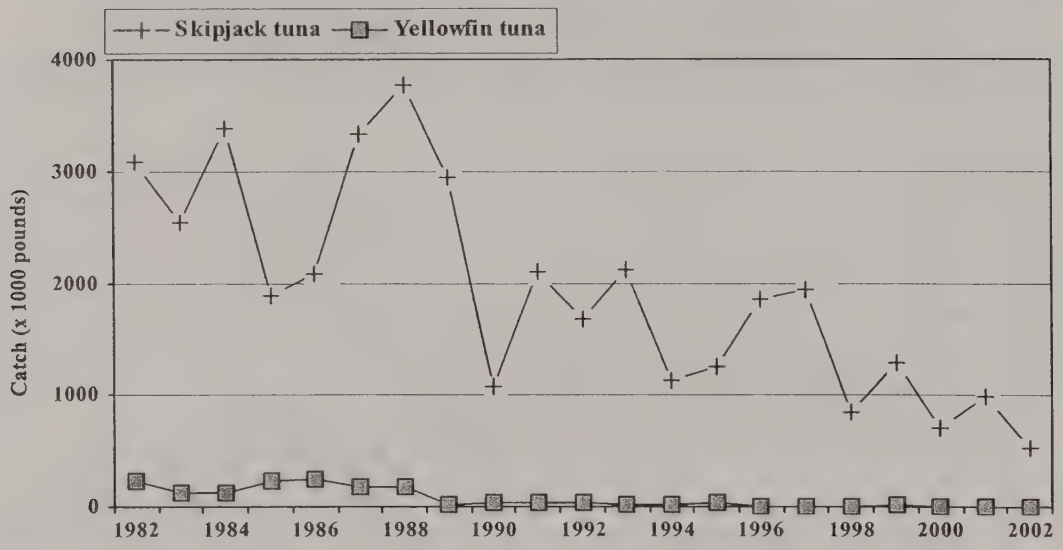


Interpretation: Catch and revenue by the aku boat fishery was 530 pounds worth an estimated ex-vessel value of $746 thousand in 2002. Aku boat catch and revenue peaked in 1988, but then declined sharply in 1990 and continued to decline slowly thereafter. The closure of the tuna cannery in 1985 was followed by a decrease in vessels participating in this fishery. The decreases in catch and revenue were a results of these events.

Source and Calculation: The aku boat catch and nominal revenue were compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. The Honolulu Consumer Price Index (CPI) was applied to the nominal revenue to derive inflation-adjusted revenue.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1982	3,342	$ 5,105	$ 2,752	97.2
1983	2,681	$ 4,724	$ 2,602	99.3
1984	3,527	$ 4,967	$ 2,851	103.5
1985	2,114	$ 3,996	$ 2,367	106.8
1986	2,351	$ 3,899	$ 2,366	109.4
1987	3,503	$ 5,886	$ 3,751	114.9
1988	3,940	$ 6,019	$ 4,063	121.7
1989	2,962	$ 5,808	$ 4,146	128.7
1990	1,116	$ 2,445	$ 1,873	138.1
1991	2,146	$ 3,297	$ 2,706	148.0
1992	1,735	$ 2,807	$ 2,415	155.1
1993	2,137	$ 2,720	$ 2,415	160.1
1994	1,159	$ 2,011	$ 1,835	164.5
1995	1,291	$ 1,662	$ 1,550	168.1
1996	1,844	$ 2,523	$ 2,389	170.7
1997	1,947	$ 2,510	$ 2,393	171.9
1998	845	$ 1,163	$ 1,106	171.5
1999	1,312	$ 1,742	$ 1,674	173.3
2000	707	$ 1,119	$ 1,094	176.3
2001	990	$ 1,380	$ 1,365	178.4
2002	530	$ 746	$ 746	180.3
Average	2,010.0	$3,170.0	$2,310.0	
SD	1,010.0	$1,700.0	$ 920.0	

Figure 51. Hawaii aku boat (pole and line) fishery catch, 1982-2002.

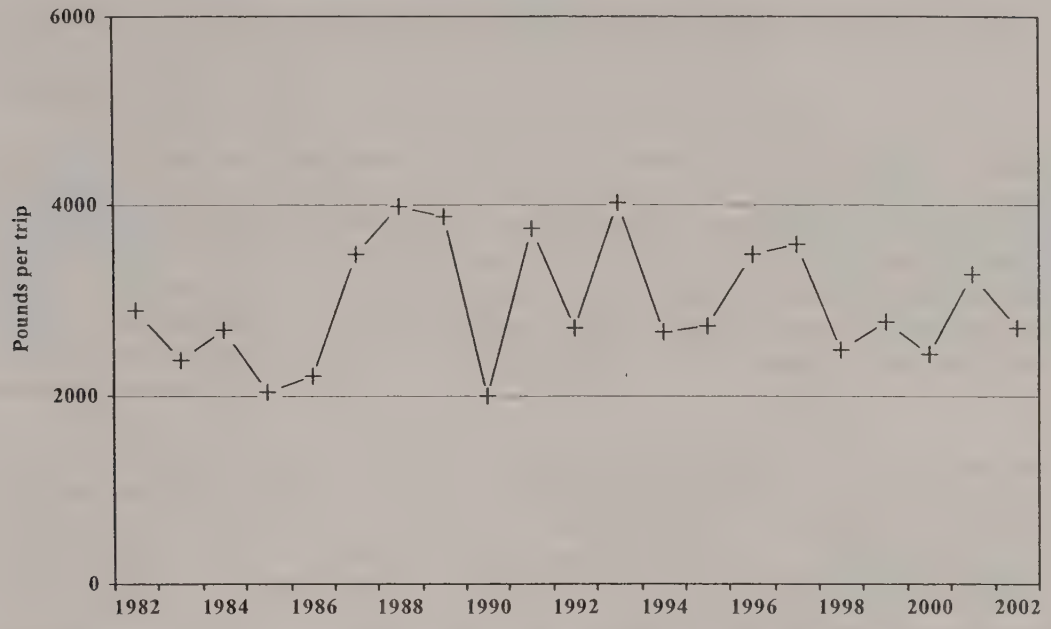


Interpretation: The aku boat fishery catches primarily skipjack tuna (aku); this single species typically represented over 95% of the total catch. There were small catches of yellowfin tuna also. Skipjack tuna catch varied annually with a overall downward trend throughout 1982-2002. Part of the reason for the decline in catch from this fishery was the closure of the tuna cannery in 1985. After the closure of the cannery, the aku boat fishery was left with only the fresh fish market.

Source and Calculations: The aku boat catch summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used.

	Akuboat catch (x 1000 pounds)				
Year	Skipjack tuna	Yellowfin tuna	Other tunas	Mahimahi	Total
1982	3,086	233	20	3	3,342
1983	2,539	121	12	9	2,681
1984	3,387	119	16	5	3,527
1985	1,881	227	6	0	2,114
1986	2,075	251	17	7	2,351
1987	3,328	173	0	2	3,503
1988	3,768	168	0	4	3,940
1989	2,938	21	2	1	2,962
1990	1,073	39	4	0	1,116
1991	2,102	44	1	0	2,146
1992	1,682	36	4	14	1,735
1993	2,121	10	3	3	2,137
1994	1,133	19	6	0	1,159
1995	1,256	34	0	0	1,291
1996	1,842	2	0	0	1,844
1997	1,942	0	0	5	1,947
1998	842	3	0	0	845
1999	1,291	21	0	0	1,312
2000	704	2	1	0	707
2001	986	4	0	0	990
2002	529	1	0	0	530
Average	1,928.9	72.7	4.3	2.6	2,008.5
SD	951.6	87.1	6.3	3.7	1,011.7

Figure 52. Hawaii aku boat (pole and line) fishery catch per trip, 1982-2002.



Interpretation: CPUE for the aku boat fishery was measured as catch (in pounds) per trip. The aku boat skipjack tuna catch per trip was 2,714 pounds per trip in 2002. Which was within the range of the 20-year time series. There was no clear trend for aku boat catch per trip.

Source and Calculations: The aku boat catch summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. Catch per trip was then calculated by dividing the catch by the total number of trips.

	Aku boat CPUE (pounds per trip)	
Year	Skipjack tuna	Total catch
1982	2,887	3,126
1983	2,373	2,505
1984	2,680	2,790
1985	2,029	2,280
1986	2,201	2,493
1987	3,474	3,657
1988	3,988	4,169
1989	3,882	3,913
1990	1,984	2,062
1991	3,746	3,826
1992	2,708	2,794
1993	4,018	4,048
1994	2,667	2,726
1995	2,731	2,806
1996	3,475	3,479
1997	3,596	3,606
1998	2,468	2,477
1999	2,770	2,816
2000	2,429	2,438
2001	3,274	3,289
2002	2,714	2,718
Average	2,956.8	3,048.6
SD	645.1	626.9

Appendix 4

Commonwealth of the Northern Mariana Islands

Introduction

The Northern Mariana Islands pelagic fishery occurs primarily from the island of Farallon de Medinilla south to the island of Rota. The fishery is characterized using data in the Commercial Purchase Data Base. The collection system for the data is dependent upon first-level purchasers of local fresh fish to accurately record all fish purchases by species categories on specially designed invoices. Staff from the Department of Lands and Natural Resources, Division of Fish and Wildlife (DFW) routinely distributes and collects invoice books from 80 participating local fish purchasers on Saipan. Purchasers include practically all fish markets, stores, restaurants, hotels and roadside vendors ("fish-mobiles").

The current commercial purchase database collection system only documents landings on Saipan. The establishment of a data collection system for the islands of Tinian and Rota are in the process. It is believed that the commercial purchase database landings include around 80% of all commercial landings on Saipan. There is also a subsistence fishery on Saipan were profit making is made by selling a small portion of their catch to cover fishing expense. Usually this is done by fishermen selling their catch going "door to door" which results in around 20% of the unreported commercial landings.

Although the Saipan data collection system has been in operation since the mid-1970s, only data collected since 1983 are considered accurate enough to be used. It is assumed that data in this report are credible.

This database lacks information concerning fishing method, location, and effort because previous data generated from Creel Survey are believed to be unreliable.

To fish commercially within the NMI's exclusive economic zone (EEZ), commercial vessels more than five net tons must have a Commercial Fishing License issued annually and jointly by the Department of Commerce and the Department of Lands and Natural Resources. Depending on the information supplied in the application package, the DFW may impose certain fishing restrictions in the form of license conditions. Although commercial boats less than five net tons are not required to have a license to fish, all fishing boats are registered with the Department of Public Safety(DPS).

Summary

Trolling is the primary fishing method utilized in the pelagic fishery. The pelagic fishing fleet, other than charter boats, consists primarily of vessels less than 24 ft in length which usually have a limited 20-mile travel radius from Saipan. In 2002 about 55 vessels were identified as involved in full-time commercial fishing and 41 vessels were classified as part-time. No fishing and/or recreational usage included 312 vessels.

Twenty-six vessels were registered with the Boating Safety Office as charter vessels for 2002. Charter vessels generally retain their catches, selling half or more to local markets. While the general magnitude of charter boat sales is unknown, it is questionable whether the local market can absorb these catches without impacting commercial fishermen. No logbook system is currently in effect.

The primary target and most marketable species for the pelagic fleet are skipjack tuna. Yellowfin and mahimahi are also marketable species but are seasonal. During their seasonal runs, these fish are usually found close to shore and provide easy targets for the local fishermen. In addition to the economic advantages of being near shore and their relative ease of capture, these species are widely accepted by all ethnic groups. This has kept market demand fairly high due to the continuing immigrant population growth on Saipan (over half of the population on Saipan is nonnative).

2002 Recommendations

1) To work closely with WesPacFIN in developing a data collection system for the new longline fishery that is beginning to develop in the CNMI.

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Table 1. NMI 2002 commercial pelagic landings, revenues and price

Species	Landings (lb.)	Revenue ($)	Ave. Price ($/lb.)
Skipjack tuna	177,487	353,230	1.99
Yellowfin tuna	29,394	61,231	2.08
Kawakawa	3,582	6,120	1.71
Subtotal Above Tunas	**210,463**	**420,581**	**1.93**
Dogtooth tuna	13,072	22,368	1.71
Mahimahi	17,937	34,025	1.90
Marlin	1,261	2,249	1.78
Sailfish	18	35	2.00
Wahoo	8,160	16,152	1.98
Subtotal Other PPMUS	**40,448**	**74,829**	**1.87**
Unidentified Pelagics	316	724	2.29
[1]Barracuda	59	162	2.75
Rainbow runner	1,988	3,434	1.73
Subtotal Misc.	**2,363**	**4,320**	**2.26**
All Pelagics	**253,274**	**499,730**	**2.02**

Interpretation: Skipjack landings increased 25% or more than 40,000 pounds in 2002. Skipjack tuna continues to dominate the pelagic landings, comprising around 75 % of the (commercially receipted) industry's pelagic catch. Yellowfin tuna and mahimahi were still ranked second and third in total landings during 2002. Mahimahi landings increased by 21% in 2002 while yellowfin landings also increased 51%. Increase in yellowfin landings in partly due to landings from the Northern Islands and by a longline experiment conducted by a fishing company. Skipjack tunas are easily caught in near shore waters throughout the year. Mahimahi is seasonal with peak catch usually from February through April. Yellowfin season usually runs from April to September. The overall pelagic catch increased 29% in 2002.

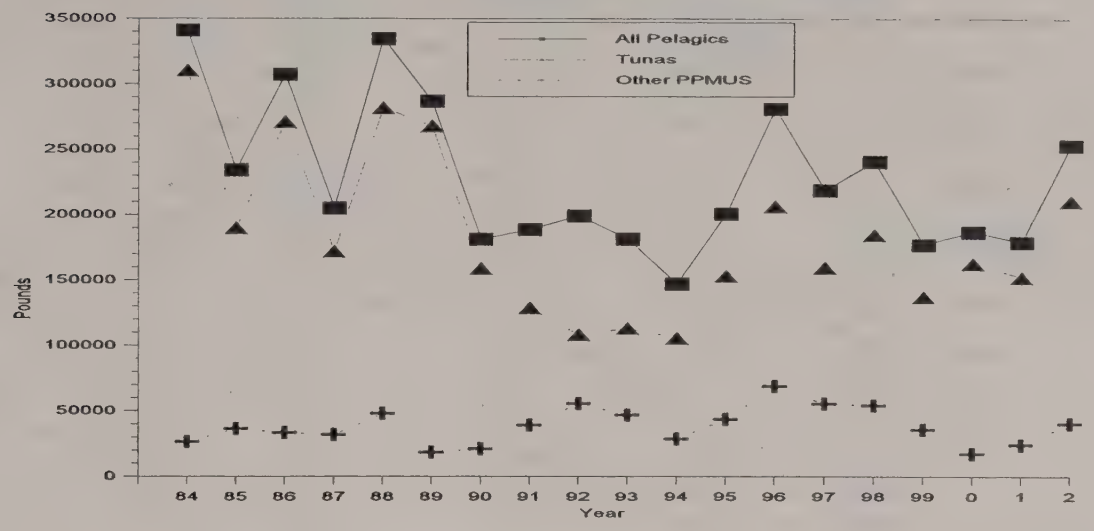
The highest average price of identified pelagic species was $2.08/lb for yellowfin. The lowest priced species are Kawakawa and Dogtooth. In 2002, Dogtooth tuna increased in landings by 73% partly due to the bottom fishing in Northern Islands. The average price per pound for Skipjack tuna, the species with the greatest landings, remained stable around $1.99/lb and increased landings by 25% in 2002.

The catch of Blue Marlin decreased from 1,924 pounds in 2001 to 1,261 pounds in 2002. The low ex-vessel price may be partially related to the manner in which the fish is kept prior to sale. Other attributes of the Blue Marlin that may make it unpopular among the public is it's bulky size and the relative quality of the cooked product. Fishers generally sell the whole fish to avoid cleaning and repackaging into smaller units.

Source and Calculation: Annual summaries for each species from the Commercial Purchase Data Base invoices.

[1]Single purchase recorded in commercial purchase invoice therefore not an average price. Barracuda is not a marketable species.

Figure 1. NMI annual commercial landings: all pelagics, tuna and PPMUS.

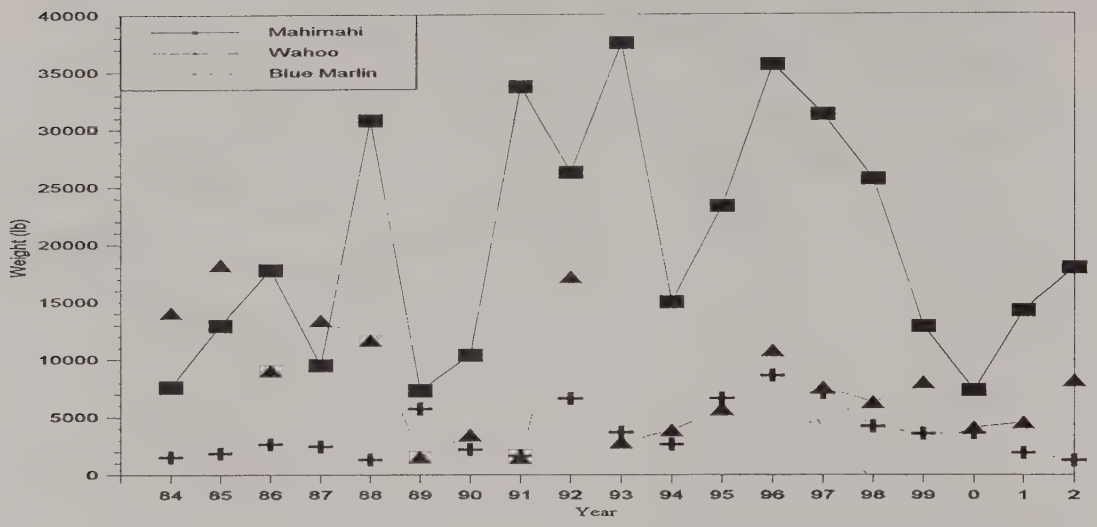


Interpretation: Total weight of pelagics landed in 2002 increased 29% from 2001 level. Tuna landings have also increased by 28% or more than 58,000 pounds. Landings recorded in the "Other PPMUS" category increased by 16,000 pounds or 40% from 2001 figures.

Source and Calculation: All pelagics, tuna and other PPMUS landings were summed from the Commercial Purchase Data Base.

	Total Landings (lb.)		
Year	**All Pelagics**	**Tunas**	**Other PPMUS**
1983	245,986	204,693	28,852
1984	341,137	310,424	26,529
1985	234,223	189,854	36,382
1986	307,460	271,280	33,500
1987	205,069	171,958	31,834
1988	334,523	281,872	47,960
1989	286,784	267,811	18,313
1990	181,078	158,965	21,116
1991	188,644	128,848	39,125
1992	199,157	108,242	55,614
1993	181,395	113,231	47,035
1994	147,086	105,748	28,377
1995	200,676	153,271	43,578
1996	281,205	206,404	68,861
1997	218,882	159,676	55,608
1998	240,711	184,611	54,299
1999	176,997	137,174	35,789
2000	186,850	162,748	17,503
2001	178,893	152,260	24,267
2002	**253,273**	**210,463**	**40,448**
Average	229,501	183,977	37,750
Standard Deviation	55,832	59,710	13,976

Figure 2. NMI annual commercial landings: mahimahi, wahoo, and marlin.



Interpretation: Mahimahi landings increased by 21% from 14,230 pounds in 2001 to 17,937 pounds in 2002. It is noteworthy that the NMI and Guam mahimahi catches have been fluctuating similarly since 1987, which may indicate a strong biological influence in local landing patterns.

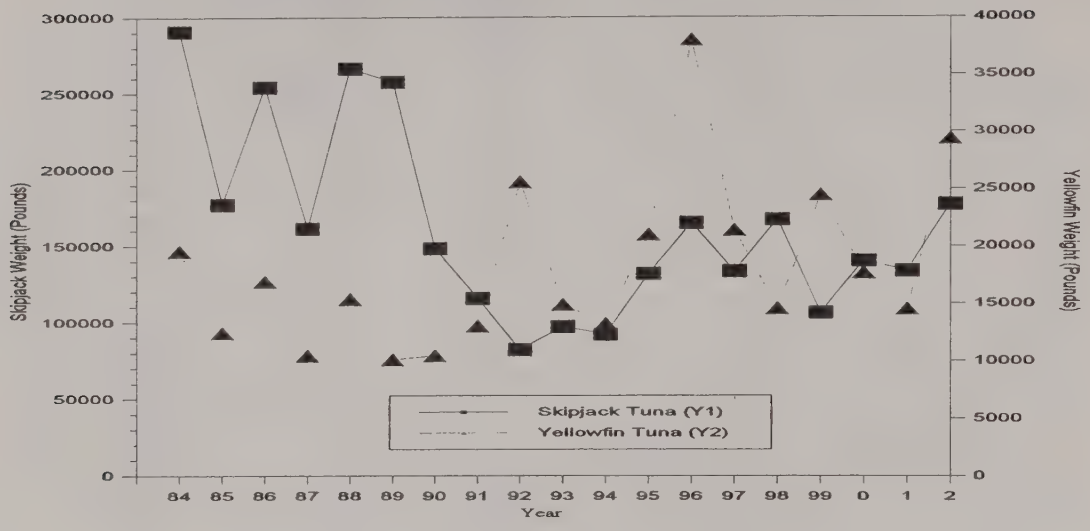
From 1983 to 1988, wahoo landings were somewhat consistent and did not fall below 7,000 lbs., but in 1989 landings notably declined by 86% and remained at depressed levels until the dramatic increase in landings during 1992. Following the near-record 1992 landings, the 1993 wahoo landings again decreased by 84%, falling below the mean. Wahoo landings in 2001 increased by 362 pounds or 11% over the 2000 landings. Wahoo landings continued to increase in 2002 by 44% over the previous year.

The Blue Marlin landing decreased 34% from the 2001 figures. Blue marlin is rarely a target by the commercial fishermen except for charter boats and during fishing tournaments.

Source and Calculation: The annual commercial landings of the three major PPMUS species (mahimahi, wahoo and blue marlin) were summed directly from the Commercial Purchase Data Base.

Year	Total Commercial Landings (lb)		
	Mahimahi	Wahoo	Blue Marlin
1983	13,939	8,760	3,787
1984	7,614	14,087	1,544
1985	12,955	18,251	1,860
1986	17,796	9,062	2,654
1987	9,502	13,404	2,460
1988	30,799	11,697	1,309
1989	7,320	1,571	5,704
1990	10,382	3,462	2,184
1991	33,756	1,521	1,650
1992	26,258	17,172	6,603
1993	37,545	2,822	3,687
1994	14,992	3,863	2,635
1995	23,321	5,694	6,619
1996	35,655	10,783	8,593
1997	31,277	7,580	7,068
1998	25,662	6,299	4,201
1999	12,882	7,994	3,541
2000	7,324	4,097	3,608
2001	14,230	4,550	1,924
2002	**17,937**	**8,160**	**1,261**
Average	19,557	8,041	3,645
Standard Deviation	10,121	4,931	2,172

Figure 3. NMI annual commercial landings: skipjack and yellowfin tuna.



Interpretation: Historically, skipjack landings exhibited an alternating two-year cycle from 1983 to 1988 and comprised more than 73% by weight of the total pelagic landings each year from 1983 to 1989 (data taken from Table 1 and Fig. 3). Skipjack tuna landings declined after that, reaching record lows from 1990 through 1994. In 1993 and 1994 skipjack landings showed signs of stabilizing at about half of their respective eleven and twelve year means, while the nearly 32,000 pounds increase in 1995 landings attained 61% of the 1983-1990 averages of 174,020 pounds. Skipjack landings for the year 2002 increased by 25% or over 43,000 pounds.

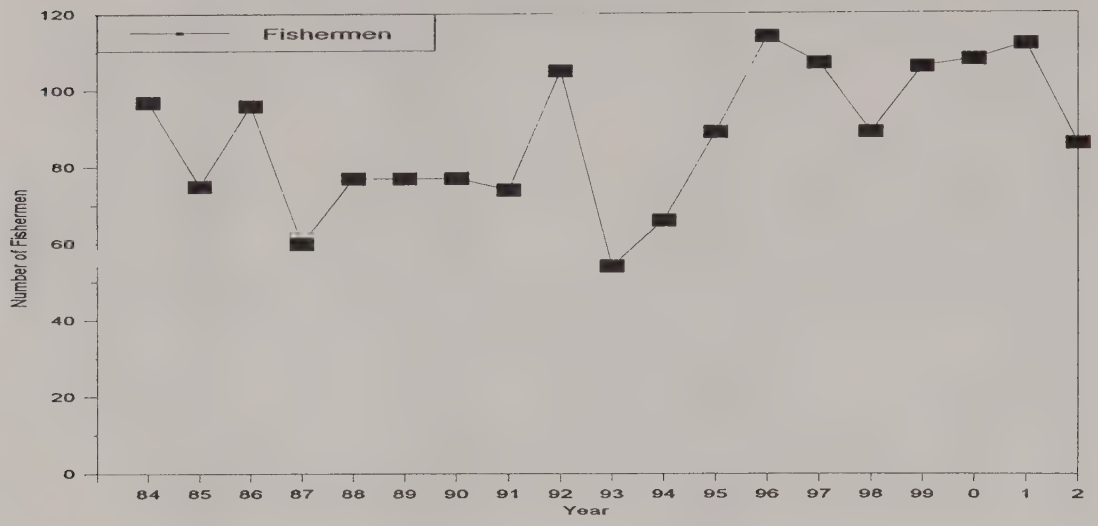
Schools of skipjack tuna have historically been common in near shore waters, providing an opportunity to catch numerous fish with a minimum of travel time and fuel costs. Skipjack is readily consumed by the local populace, primarily as sashimi.

Although more highly prized than skipjack, yellowfin tuna are not as common, and therefore not landed as often. The average fish size tends to be smaller when compared with yellowfin tuna from other geographic areas. The total landings for yellowfin tuna increased 51% from the 2001 figures. Increase is partly due to landings from the Northern Islands bottom fishing fleet and a long lining experiment by 1 fishing company whom recently applied and received a federal long lining permit.

Source and Calculation: Landings were summed directly from the Commercial Purchase Data Base.

	Total Commercial Landings (lb)	
Year	**Skipjack tuna**	**Yellowfin tuna**
1983	183,412	21,281
1984	290,844	19,580
1985	177,388	12,466
1986	254,363	16,917
1987	161,504	10,454
1988	266,497	15,375
1989	257,703	10,109
1990	148,497	10,468
1991	115,802	13,042
1992	82,281	25,615
1993	97,291	14,899
1994	92,212	13,250
1995	131,779	21,031
1996	165,194	38,012
1997	133,447	21,401
1998	167,274	14,571
1999	106,484	24,499
2000	140,390	17,673
2001	133,884	14,543
2002	**177,487**	**29,394**
Average	164,187	18,229
Standard Deviation	60,648	7,103

Figure 4. Number of NMI fishermen (boats) making commercial pelagic landings.



Interpretation: The number of fishers (boats) making commercial pelagic landings was relatively constant from 1988-91 compared to earlier years, but a record high number was recorded for 1992. Part of the increase in 1992 was attributable to the influx of new fishing boats as a result of money obtained by leasing property. In addition, it was discovered that some fishermen were using several different boats, thus artificially inflating the total number of boats making pelagic landings.

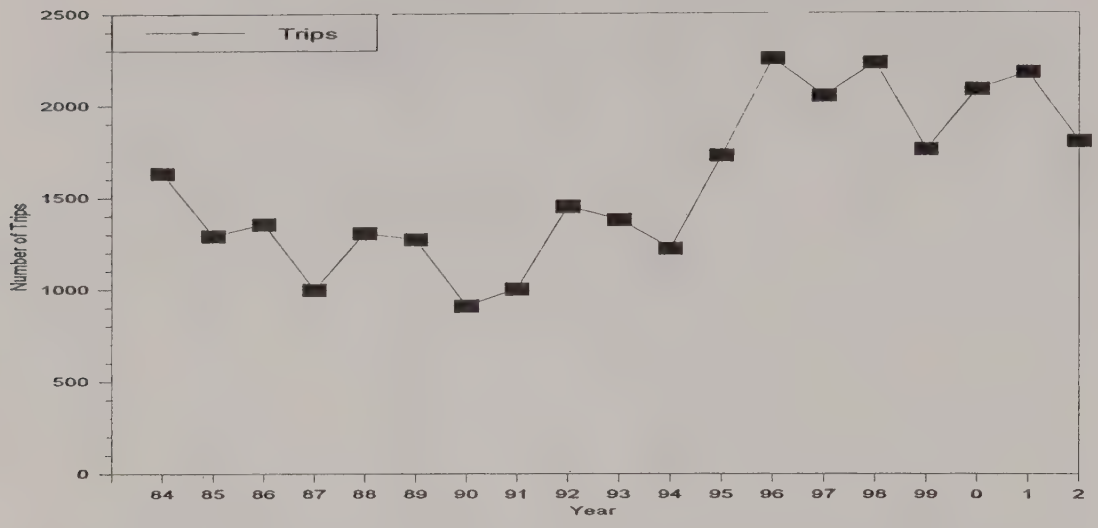
Many of the 1992's "new" fishermen, with their new boats, are believed to have left the fishery during 1993. It has been suggested that the increase from 1994 to 1997 might be due to the re-entry of repaired and refurbished boats from the 1992 fleet.

The number of fishermen making pelagic landings slightly decreased 23% from 112 in 2001 to 86 in 2002. The decrease is partly due to vendors whom own multiple fishing boats entering all their landings on a single receipt and at times combining a monthly total landings onto a single receipt.

Source and Calculation: Each invoice from the Commercial Purchase Data Base records the fisherman's name from whom the fish were purchased. The number of fishermen who sold any pelagic species was calculated directly from the data invoices.

Year	No. fishermen landing any pelagic species
1983	92
1984	97
1985	75
1986	96
1987	60
1988	77
1989	77
1990	77
1991	74
1992	105
1993	54
1994	66
1995	89
1996	114
1997	107
1998	89
1999	106
2000	108
2001	112
2002	**86**
Average	88
Standard Deviation	18

Figure 5. NMI numbers of trips catching any pelagic fish.

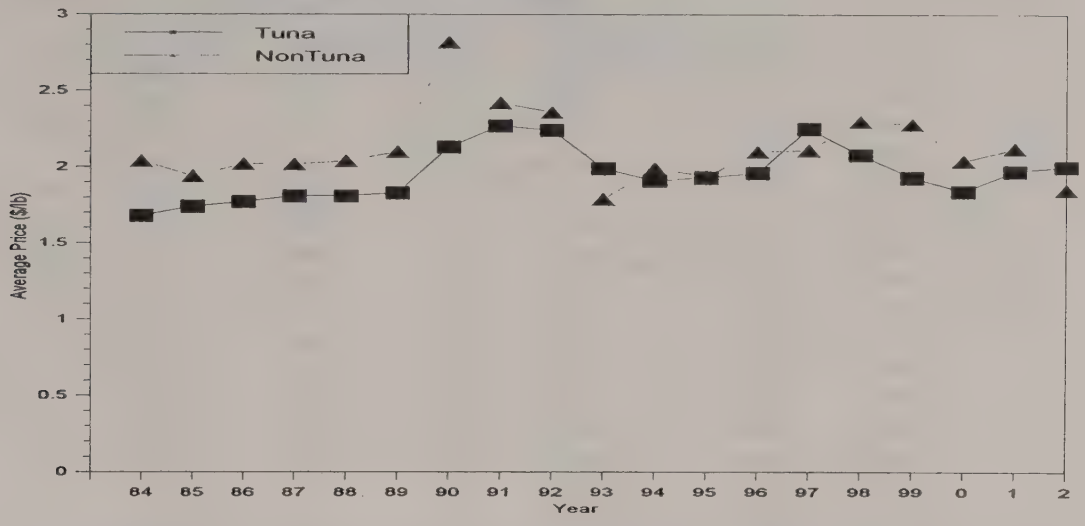


Interpretation: The number of pelagic trips decreased in 2002 by 17% from 2,176 to 1803. Several typhoon hit the Marianas which attributed to decline in fishing trips. The number of pelagic trips rose in 1998, the decrease in 1999 figures may be caused by the refusal of vendors to participate in the Ticket System.

Source and Calculation: The total trips for all pelagic species were summed from the Commercial Purchase Data Base. Trips were calculated based on the assumptions that no fisherman makes more than one trip per day, and that all sales from a single trip are made on a single day.

Year	Number trips
1983	1,408
1984	1,634
1985	1,293
1986	1,356
1987	999
1988	1,306
1989	1,272
1990	910
1991	1,002
1992	1,451
1993	1,378
1994	1,221
1995	1,727
1996	2,254
1997	2,050
1998	2,230
1999	1,758
2000	2,084
2001	2,176
2002	**1,803**
Average	1,566
Standard Deviation	426

Figure 6. NMI average inflation-adjusted price of tunas and other PPMUS.



Interpretation: The inflation-adjusted average price of tuna was stable from 1983 until 1989, when an obvious rise was observed. The 1990-92 rise in price corresponds with the notable decrease in Skipjack tuna landings (Fig. 3) during the same period of time. In 1994 commercially receipted tunas commanded a lower price than in recent years. However, considering the inflation-adjusted prices from 1983 to 1996, it would appear that tuna prices have, on the whole, kept pace with inflation. The average price of tuna has continued to decrease since 1997. The inflation-adjusted average price of tuna increased by 7% from 2000 to 2001 and increased less than 2% for 2002.

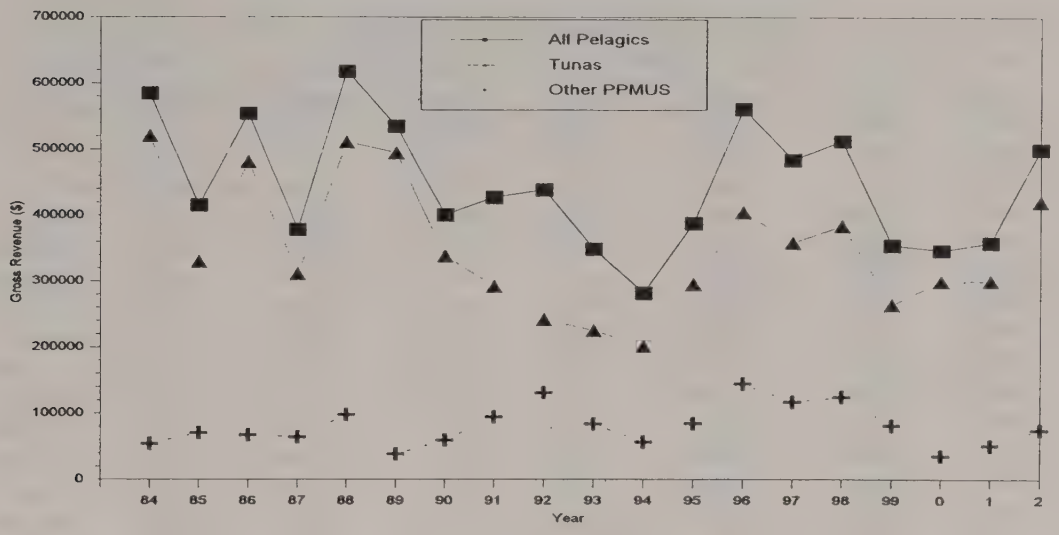
The average price of "Other PPMUS" decreased 13% in 2002 on the inflation-adjusted price.

Although there was a loss of the large Korean market in the CNMI, there appears to be no substantial loss to revenue. This may be attributed to a redirection of the market toward the local community.

Source and Calculation: The unadjusted average price is calculated by dividing the total revenues generated by the total weight sold. The inflation adjustment is made using the 1998 NMI Consumer Price Index (CPI) as the basis by which calculations of previous years' prices are made.

		Average Price ($/lb)			
		Tunas		Other PPMUS	
Year	CPI	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	140.90	.99	1.91	1.12	2.15
1984	153.20	0.95	1.68	1.15	2.04
1985	159.30	1.02	1.74	1.14	1.94
1986	163.50	1.07	1.77	1.22	2.02
1987	170.70	1.14	1.81	1.27	2.02
1988	179.60	1.20	1.81	1.35	2.04
1989	190.20	1.29	1.85	1.48	2.11
1990	199.33	1.56	2.13	2.07	2.82
1991	214.93	1.80	2.27	1.92	2.42
1992	232.90	1.91	2.24	2.01	2.36
1993	243.18	1.78	1.99	1.59	1.79
1994	250.00	1.75	1.91	1.83	1.99
1995	254.48	1.80	1.93	1.81	1.94
1996	261.98	1.89	1.96	2.02	2.10
1997	264.95	2.20	2.25	2.07	2.11
1998	264.18	2.02	2.08	2.23	2.30
1999	267.80	1.91	1.93	2.26	2.28
2000	273.23	1.86	1.84	2.06	2.04
2001	270.98	1.97	1.97	2.12	2.12
2002	**271.53**	**2.00**	**2.00**	**1.85**	**1.85**
Average	221.34	1.61	1.95	1.84	2.12
Standard Deviation	46.94	0.41	0.17	0.40	0.23

Figure 7. NMI annual commercial adjusted revenues.



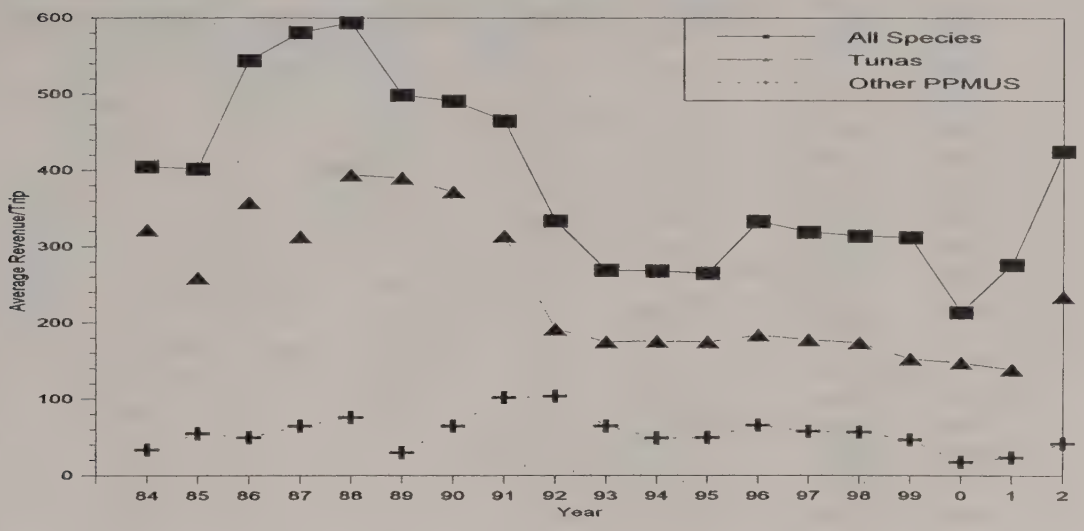
Interpretation: The erratic fluctuations of the inflation-adjusted revenues for Tunas and for All Pelagics prior to 1990 is most likely due to the annual variations in skipjack tuna landings (see Fig. 3) which completely dominated the tuna category and the "All Pelagic" category.

The tunas' inflation-adjusted revenues increased 29% from the 2001 figures. Data also indicates an increase of 29% for the "Other PPMUS" inflation-adjusted revenues for the year 2002.

Source and Calculation: Annual revenue in dollars was summed separately for all pelagic fish, tunas and other PPMUS. Inflation-adjusted revenues were calculated using the Consumer Price Index, with 1998 as a base by which previous years' nominal prices are adjusted.

		Revenues ($)					
		All Pelagics		Tunas		Other PPMUS	
Year	CPI	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	140.90	248,388	479,389	202,801	391,406	32,213	62,171
1984	153.20	330,255	584,551	294,078	520,518	30,629	54,213
1985	159.30	244,216	415,167	193,965	329,741	41,453	70,470
1986	163.50	333,768	554,055	289,682	480,872	40,789	67,710
1987	170.70	237,689	377,926	195,794	311,312	40,416	64,261
1988	179.60	409,077	617,706	338,349	510,907	64,937	98,055
1989	190.20	373,929	534,718	345,840	494,551	27,044	38,673
1990	199.33	294,401	400,385	248,470	337,919	43,711	59,447
1991	214.93	338,790	426,875	232,078	292,418	75,039	94,549
1992	232.90	374,798	438,514	206,770	241,921	112,051	131,100
1993	243.18	311,423	348,794	201,377	225,542	75,003	84,003
1994	250.00	258,908	282,210	184,926	201,569	51,936	56,610
1995	254.48	362,178	387,530	275,793	295,099	79,081	84,617
1996	261.98	539,454	561,032	389,092	404,656	139,308	144,880
1997	264.95	474,528	484,019	351,616	358,648	114,986	117,286
1998	264.18	497,611	512,539	372,384	383,556	121,195	124,831
1999	267.80	350,840	354,348	261,942	264,561	80,862	81,671
2000	273.23	349,785	346,287	302,476	299,451	36,093	35,732
2001	270.98	358,112	358,112	300,328	300,328	51,526	51,526
2002	**271.53**	**499,730**	**499,730**	**420,581**	**420,581**	**74,829**	**74,829**
Average	221.34	359,394	448,194	280,417	353,278	66,655	79,832
Standard Deviation	46.94	87,816	93,213	72,164	95,578	33,378	30,560

Figure 8. NMI annual commercial adjusted revenues per trip for PPMUS trips.

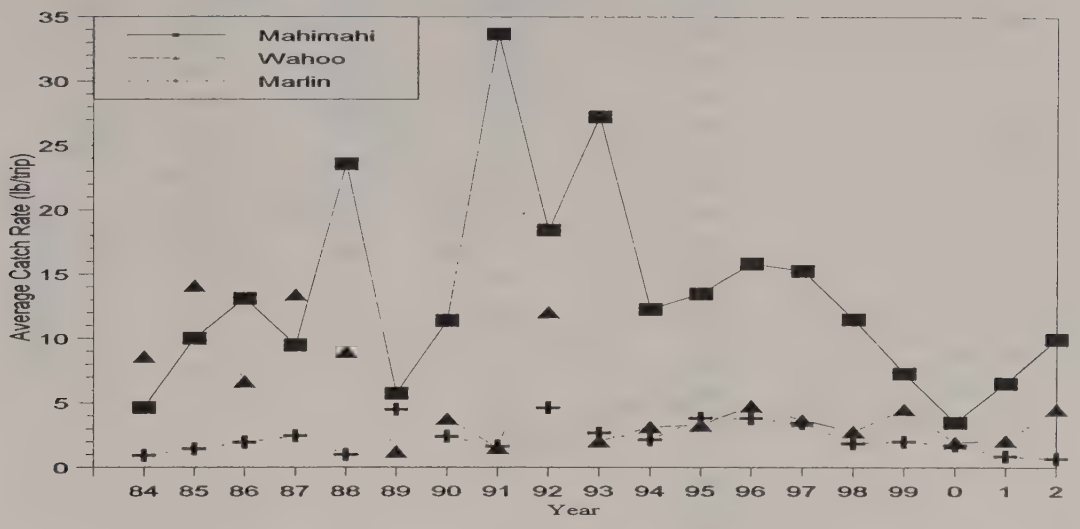


Interpretation: The inflation-adjusted revenue per trip for "All Species" indicates an increase of 35% while "Other PPMUS" indicates an increase of 43% and "Tunas" increased 41% in 2002. The current year values for all categories were below their respective 18 year means.

Source and Calculation: Values were obtained by selecting, from the Commercial Purchase Data Base, all trips which landed at least one PPMUS, and then calculating a) the average revenue of all species combined, b) the average revenue of other PPMUS only, and c) the average revenue of tuna only.

		Revenues per PPMUS Trip ($)					
		All Species		Tunas		Other PPMUS	
Year	CPI	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	140.90	199	384	151	292	24	46
1984	153.20	229	405	182	322	19	34
1985	159.30	237	402	152	259	33	55
1986	163.50	328	544	216	358	30	50
1987	170.70	365	581	197	313	41	65
1988	179.60	393	594	261	394	50	76
1989	190.20	349	499	273	390	21	30
1990	199.33	361	491	274	372	48	65
1991	214.93	369	465	249	314	81	102
1992	232.90	286	334	164	192	89	104
1993	243.18	241	269	156	175	58	65
1994	250.00	246	268	162	176	45	49
1995	254.48	247	265	163	175	47	50
1996	261.98	320	333	177	184	63	66
1997	264.95	313	319	174	178	57	58
1998	264.18	305	314	169	174	55	57
1999	267.80	309	312	152	153	47	47
2000	273.23	216	214	149	148	18	18
2001	270.98	276	276	139	139	24	24
2002	**271.53**	**425**	**425**	**234**	**234**	**42**	**42**
Average	221.34	301	385	190	247	45	55
Standard Deviation	46.94	64	113	45	89	20	22

Figure 9. NMI trolling catch rate of mahimahi, wahoo and marlin.



Interpretation: The 2002 mahimahi catch rate increased by 34% from 2001, which still fell below the eighteen-year mean. It may also be biological because it appears that the trolling catch rates of Guam and the NMI have fluctuated similarly over the last eighteen years. There has also been a three-year decline in the landing of the species.

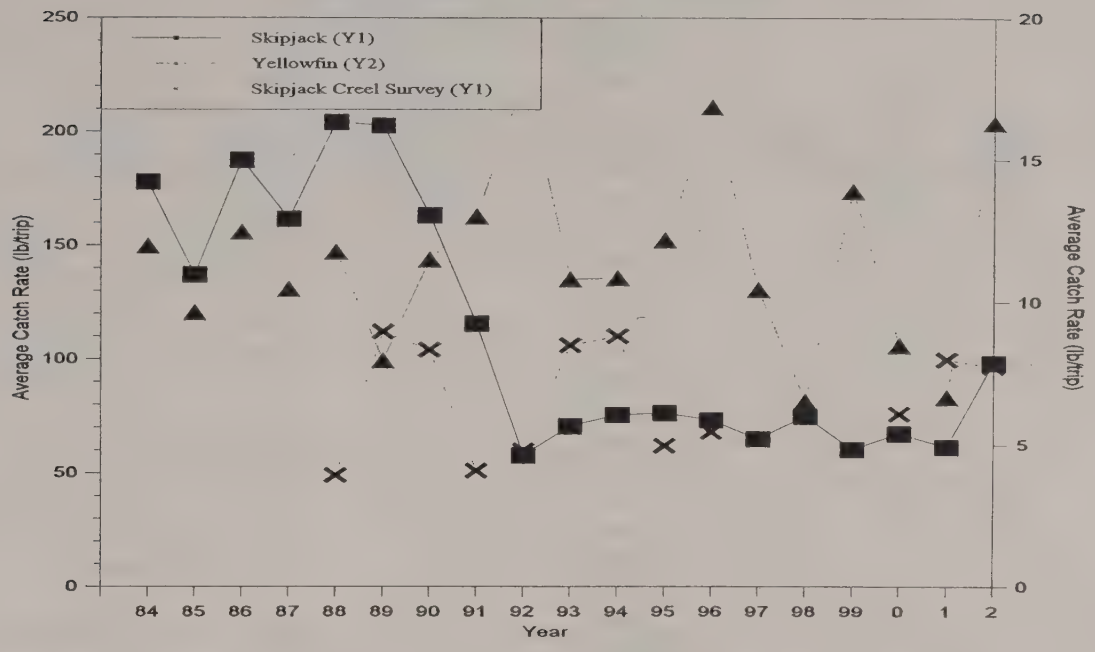
Prior to the 1989 record low, wahoo catch rates rivaled those for mahimahi. Wahoo catch rates have generally never regained those historical levels. The 2001 catch rate increased by 6% from 2000, and again increased 54% for 2002.

Marlin catch rates decreased by 20% from 2001 level. Marlins are not a marketable species and is rarely a target by fishermen except during fishing tournaments. During the 2000 Saipan International Fishing Derby a 996-pound blue marlin was landed.

Source and Calculation: Annual catch rates for selected species were obtained by calculating the average weight per trip for each year. Trips were assumed to be one day in length and each commercial invoice assumed to represent one trip.

	Trolling Catch Rate (lb/trip)		
Year	**Mahimahi**	**Wahoo**	**Marlin**
1983	9.90	6.22	2.69
1984	4.66	8.62	.94
1985	10.02	14.12	1.44
1986	13.12	6.68	1.96
1987	9.51	13.42	2.46
1988	23.58	8.96	1.00
1989	5.75	1.24	4.48
1990	11.41	3.80	2.40
1991	33.69	1.52	1.65
1992	18.43	12.05	4.63
1993	27.25	2.05	2.68
1994	12.28	3.16	2.16
1995	13.50	3.30	3.83
1996	15.82	4.78	3.81
1997	15.26	3.70	3.45
1998	11.51	2.82	1.88
1999	7.31	4.54	2.01
2000	3.51	1.97	1.73
2001	6.54	2.09	.88
2002	**9.95**	**4.53**	**.70**
Average	13.15	5.48	2.34
Standard Deviation	7.67	3.97	1.18

Figure 10. NMI trolling catch rates of skipjack and yellowfin tuna.



Interpretation: Catch rates for Skipjack tuna decreased dramatically commencing in 1990. The 1992 through 1997 catch rates have appeared to stabilize around the six-year mean of 55.7lb/trip. The Creel Survey data on skipjack tuna catch rates show a very different pattern from the Commercial Purchase data. Creel survey catch rates show catch rates oscillating between 50 and 100 lb/trip both before and after 1991 whereas, the Commercial Purchase data indicate sustained high catch rates before, and low catch rates after 1991. Reason for pattern remains obscure despite several attempts to clarify. Catch rate based on the Commercial Purchase Data Base for 2001 of 49.22 lbs/trip is a decrease of 9% in comparison with the 2000 catch rate of 53.89. Skipjack tuna is the preferred species in the troll fishery of the NMI because of their relative ease of capture and local popularity. Previous discussions have suggested that non-tuna PPMUS may be increasing in value and a slight shift in target troll fish may be occurring.
Catch rates of yellowfin tuna per trip more than doubled from 1998 levels. However, 2000 catch rates declined by 39% and continued to declined 21% in 2001. However yellowfin catch rates in 2002 increased by 59% partly due to landings from the Northern Islands Bottom fishing feet and a longline experiment with gear less than 1 mile long conducted by a fishing company whom recently applied and received a federal longline permit. Yellowfin tuna is highly prized compared to skipjack tuna but it is seasonal and therefore not encountered as often.

Source and Calculation: Data were summarized from the Commercial Purchase Data Base, which provides average pounds caught per trip. Annual catch rates for selected species were obtained by calculating the average weight per trip for each year. Trips were assumed to be one day in length and each commercial invoice represents one trip.

	Trolling Catch Rate (lb/trip)	
Year	Skipjack	Yellowfin
1983	130.26	15.11
1984	178.00	11.98
1985	137.19	9.64
1986	187.58	12.48
1987	161.67	10.46
1988	204.06	11.77
1989	202.60	7.95
1990	163.18	11.50
1991	115.57	13.02
1992	57.74	17.98
1993	70.60	10.81
1994	75.52	10.85
1995	76.31	12.18
1996	73.29	16.86
1997	65.10	10.44
1998	75.01	6.53
1999	60.43	13.90
2000	67.37	8.48
2001	61.50	6.68
2002	**98.44**	**16.30**
Average	113.07	11.75
Standard Deviation	52.57	3.18

Offshore Daytime Creel Survey Bycatch Summary
Based on the Interview Catch Data in Year 2000-2002
Method: Trolling

		Number Caught					Trip		
	Species	Released	Dead/Injd	Both	All	BC%	With BC	All	BC%
Non Charter							2	410	0.49
	Mahimahi	3		3	410	0.73			
	Yellowfin Tuna		1	1	249	0.40			
	Total			4	659	0.61			
	Compared With All Species			4	9,849	0.04			
Charter							0	42	0.00
	Compared With All Species			0	258	0.00			

Interpretation: With the assistance of NMFS staff, the implementation of an Offshore Day Time Creel Survey program began on April 2000. One of the main purpose of reimplementing the Offshore Creel Survey was to address the issue of bycatch.

A summary report by both non charter and charter boats indicates less than 1% or 4 out of 9,849 of the total pelagic species landed is released. The only two species reported as bycatch was Mahimahi and Yellowfin Tuna. 3 out of 410 Mahimahi or .73% landed was released. And 1 out of 249 Yellowfin Tuna or .40% landed was released. Charter boats had no bycatch reported.

Bycatch in the CNMI has been believed in the past not to exist which is further supported by the results of the Offshore Creel Survey. The CNMI will continue sampling inorder to monitor this issue however it is a common practice by fishermen to keep all species caught regardless of size or condition.

Source: Offshore Daytime Creel Survey Expansion Program.

Appendix 5

International Module

The areas administered by the Council are surrounded by large and diverse fisheries targeting pelagic species. The International Module contains reported catches of pelagic species in the entire Pacific Ocean by fleets of various nations and a summary of the status of tuna stocks in the western and central Pacific Ocean (WCPO). The spatial distribution of catch is illustrated in 2001 for the purse seine fishery, longline and pole-and-line fisheries.

Fishery trends in the Pacific Ocean for the purse seine, longline and pole-and-line fisheries.

The 2002 purse-seine fishery

Vessels The majority of the WCPO purse-seine catch (>70%) is taken by the four main distant-water fishing fleets (Japan, Korea, Taiwan and USA) which have numbered around 140 vessels in recent years. The remainder is taken by fleets of Pacific Islands domestic vessels (~13% in recent years), the Philippines fisheries and a variety of other fleets, including a small seasonally active Spanish fleet.

Catch The purse-seine fishery has accounted for around 55-60% of the WCPO total catch since the early 1990s, with annual catches in the range 790,000–1,200,000 mt. The provisional 2002 purse-seine catch of 1,157,045 mt was the second highest on record and maintained the catch in excess of 1,000,000 mt since the record year attained in 1998. A general absence of the restrictions placed on effort in the purse seine fishery in the previous two years (as a result of falling prices) no doubt contributed to this higher catch level. The purse seine skipjack catch for 2002 (962,740 mt – 83%) was a record for this fishery (slightly higher than the previous record in 1998 – 947,149 mt). In contrast, the purse seine yellowfin catch for 2002 (171,767 mt – 15%) was the lowest for six years, and considered unusual for an *El Nino* period. The estimated purse seine bigeye catch for 2002 (22,538 mt – 2%) continues the declining trend in catches since the record 1999 catch (34,932 mt), primarily due to the gradual reduction in fishing effort on drifting FADs over recent years. Catches for all fleets except Japan increased during 2002 and Taiwan has been the highest producer in the tropical purse seine fishery since 1996.

Fleet distribution Catch distribution in tropical areas of the WCPO is strongly influenced by ENSO events as fleets fish further to the east during El Nino years and a contraction westwards during La Nina periods. The WCPO experienced an ENSO-transitional (or normal) period during 2001, and an El Nino period during 2002. This has resulted in a gradual shift of activities eastwards during 2001 and 2002 compared to activities during 2000. During 2002, there was less fishing activity west of 160°E longitude by all fleets compared to 2001, with effort extending beyond the Kiribati Line Group (around 150°W) for three of the four fleets.

Table 1. Total reported purse seine catch (metric tonnes) of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. Source: SCTB16 report.

Year	Skipjack	Yellowfin	Bigeye	Total
1967	108,916	76,583	976	186,475
1968	61,847	100,830	2,679	165,356
1969	45,279	123,179	624	169,082
1970	52,687	155,166	2,058	209,911
1971	102,118	125,263	3,371	230,752
1972	46,125	181,232	3,037	230,394
1973	56,284	217,104	2,926	276,314
1974	85,997	220,025	2,279	308,301
1975	128,320	210,651	5,023	343,994
1976	142,989	249,112	11,505	403,606
1977	117,350	214,936	8,640	340,926
1978	205,186	189,670	12,905	407,761
1979	189,797	215,598	9,564	414,959
1980	206,223	192,492	17,480	416,195
1981	207,881	242,248	14,405	464,534
1982	269,375	196,814	9,229	475,418
1983	378,141	194,951	12,543	585,635
1984	387,880	253,283	14,766	655,929
1985	353,582	318,941	11,506	684,029
1986	431,095	370,192	9,448	810,735
1987	433,272	423,447	12,166	868,885
1988	569,910	382,931	8,356	961,197
1989	566,040	448,956	14,121	1,029,117
1990	674,330	444,153	16,844	1,135,327
1991	833,447	446,958	17,194	1,297,599
1992	788,747	474,564	24,972	1,288,283
1993	663,292	467,701	22,440	1,153,433
1994	792,320	438,807	40,004	1,271,131
1995	855,124	408,266	50,335	1,313,725
1996	847,307	368,857	68,318	1,284,482
1997	823,107	512,971	82,182	1,418,260
1998	1,090,424	532,755	53,764	1,676,943
1999	1,057,339	515,702	75,500	1,648,541
2000	1,080,559	478,219	101,025	1,659,803
2001	981,568	612,387	69,668	1,663,623
2002	1,120,124	589,239	57,641	1,767,004
Average	465,388	322,061	24,153	811,602
STD Deviation	363,691	151,510	26,931	529,885

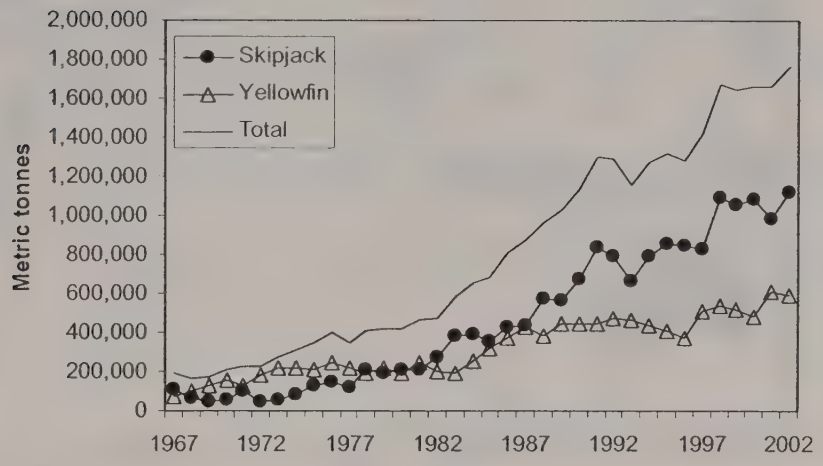


Figure 1. Total purse seine catch of skipjack and yellowfin tuna in the Pacific Ocean, 1967–2002. Source: SCTB16 report.

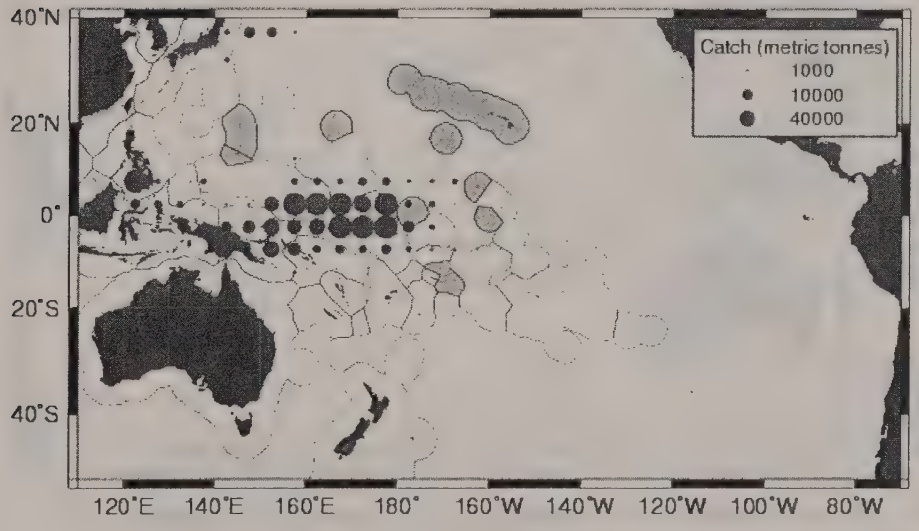


Figure 2. Distribution of total purse seine WCPO skipjack catch in 2001. Source: SPC public domain data.

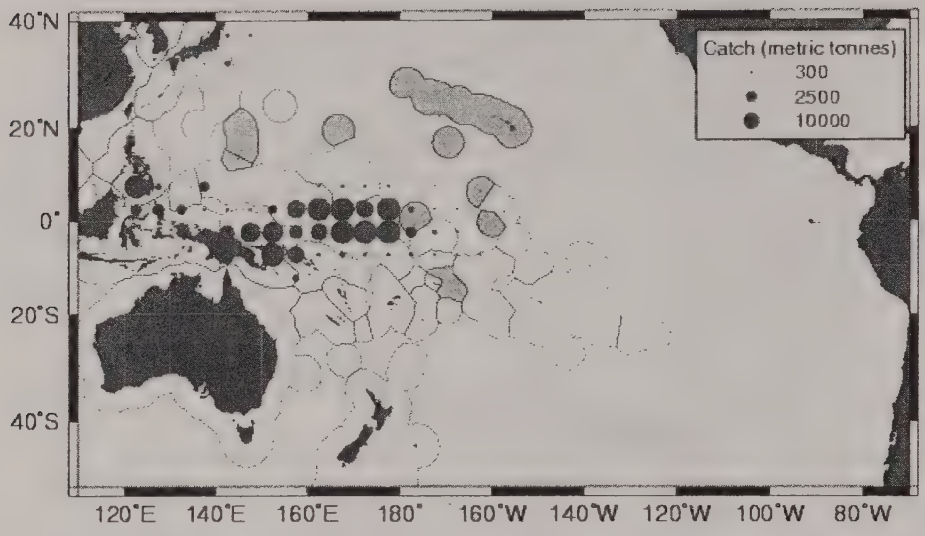


Figure 3. Distribution of total purse seine WCPO yellowfin catch in 2001. Source: SPC public domain data.

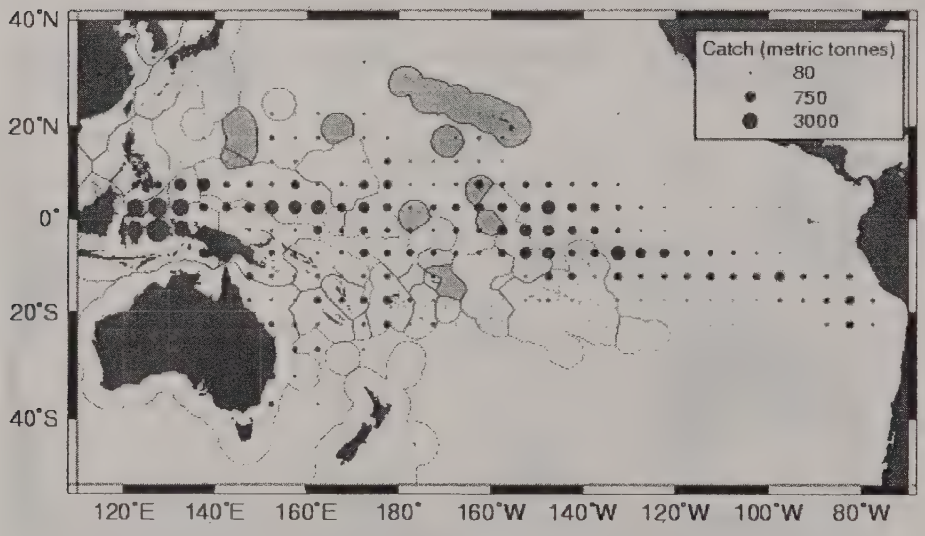


Figure 4. Distribution of longline catches of yellowfin tuna reported in 2001. Source: SPC public domain data.

The 2002 longline fishery

Vessels

The diverse longline fleet in the WCPO was composed of roughly 5,000 vessels in 2002. These vessels can be divided into four components largely based on the area of fishing operations:

Over 500 vessels are **domestically-based in the Pacific Islands** with the Samoa alia fleet representing half of these vessels,

approximately 3,000 vessels are **domestically-based in non-Pacific Island** countries such as Japan and Taiwan,

about 1,000 large **distant-water** freezer vessels from Japan, Korea and Taiwan that operate over large areas in the region, and

about 500 **offshore vessels based in Pacific Island countries**. The offshore fleet is composed of equal numbers of vessels from mainland China, Japan and Taiwan.

Catch

The 2002 longline catch (221,818 mt) was the highest on record, but only 500 mt more than the previous record catch in 2001 (221,248 mt). The bigeye catch (64,185 mt) was the largest for four years, and the albacore catch (WCPO–76,828 mt; south Pacific–46,819 mt) was the second highest on record (after the 2001 catch). The 2002 yellowfin catch (77,177 mt) was the highest catch in seven years and continued the significant recovery from the lowest catch (60,414 mt) recorded for nearly 30 years in 1999. Domestic fleet sizes continue to increase at the expense of foreign-offshore and distant-water fleets, although the Taiwanese distant-water longline fleet has increased by 70% (to 133 vessels in 2002) over the past two years. This increase is primarily due to several vessels shifting activities to the Pacific Ocean from the Indian and Atlantic Oceans. Most of these vessels are "super-cold" longline vessels targeting bigeye and yellowfin tunas, and now contribute to a more diverse fleet that previously only concentrated on targeting albacore.

Fleet distribution

Effort by the large-vessel, distant-water fleets of Japan, Korea and Taiwan account for most of the effort but this has declined to some extent over the past decade. Effort by these fleets is widespread as sectors of these fleets target bigeye and yellowfin for the frozen sashimi market, and albacore in the more temperate waters for canning. Activity by the foreign-offshore fleets from Japan, mainland China and Taiwan are restricted to the tropical waters, targeting bigeye and yellowfin for the fresh sashimi market; these fleets have limited overlap with the distant-water fleets. The substantial "offshore" effort in the west of the region is primarily by Indonesian and Taiwanese domestic fleets targeting yellowfin and bigeye. The growth in domestic fleets in the South Pacific over recent years has been noted; the most significant examples are the increases in the Fijian and French Polynesian fleets. As noted above, some vessels in the distant-water Taiwanese longline fleet are now targeting bigeye in the eastern equatorial areas of the WCPO.

Table 2. Total reported longline catch (metric tonnes) of PMUS in the Pacific Ocean. Source: SCTB16 report and SPC public domain data.

Year	Albacore	Yellowfin	Bigeye	Striped Marlin	Black Marlin	Blue Marlin	Swordfish	Total
1962	50,990	73,290	78,816	22,507	2,229	18,797	11,216	257,845
1963	44,566	79,732	106,325	26,602	2,342	19,032	11,414	290,013
1964	38,418	68,523	74,851	39,524	1,876	13,989	8,615	245,796
1965	39,803	69,014	57,304	32,794	2,375	11,084	9,665	222,039
1966	64,442	78,208	65,314	27,351	2,172	10,497	11,615	259,599
1967	69,834	50,040	66,848	31,827	1,825	9,702	12,041	242,116
1968	53,721	61,441	58,508	39,418	1,883	9,469	11,477	235,917
1969	43,014	67,256	80,949	25,564	2,073	10,348	14,358	243,561
1970	50,398	65,712	67,230	35,416	1,605	12,686	10,329	243,376
1971	48,001	57,687	64,463	30,975	2,127	8,058	9,410	220,721
1972	49,985	67,949	81,457	20,922	1,884	9,334	9,102	240,634
1973	54,586	68,525	86,254	18,603	1,935	9,964	9,604	249,470
1974	44,973	61,292	75,990	18,559	1,620	8,946	8,693	220,074
1975	40,439	71,200	94,393	15,181	1,845	7,962	9,124	240,144
1976	42,063	86,200	118,359	16,197	1,056	8,694	11,350	283,919
1977	52,247	100,053	135,906	9,325	936	8,523	10,927	317,917
1978	48,447	119,307	119,101	9,973	1,624	10,090	10,930	319,472
1979	43,400	116,312	112,054	15,694	1,950	10,439	11,189	311,039
1980	46,631	130,246	117,556	17,594	1,652	10,988	17,714	342,382
1981	51,377	100,476	93,983	20,840	2,067	13,409	22,791	304,943
1982	46,158	94,515	97,382	20,980	2,277	13,401	19,248	293,960
1983	40,380	94,162	100,492	14,480	1,916	10,997	20,730	283,157
1984	36,009	79,867	92,257	11,726	1,524	13,298	16,366	251,046
1985	41,889	86,239	116,513	12,494	1,234	11,589	18,849	288,807
1986	45,810	83,243	146,182	17,322	1,250	14,278	20,905	328,991
1987	41,911	90,971	156,347	20,241	1,896	18,196	25,506	355,068
1988	46,717	95,133	121,066	18,264	2,752	15,858	24,332	324,121
1989	36,217	80,876	122,142	12,520	1,515	13,125	16,542	282,937
1990	38,897	105,464	161,792	9,072	1,880	12,157	15,226	344,488
1991	42,422	91,312	152,829	10,518	2,180	14,539	18,265	332,065
1992	49,976	89,532	145,458	8,753	2,103	14,400	19,102	329,325
1993	60,930	88,776	127,419	10,359	1,707	15,602	19,065	323,858
1994	64,024	102,355	134,909	10,372	1,834	17,388	15,753	346,635
1995	58,163	100,006	109,577	11,233	1,370	17,684	14,052	312,085
1996	63,171	92,342	90,996	8,198	865	13,331	15,481	284,383
1997	80,387	88,995	103,065	9,314	1,554	14,583	15,788	313,686
1998	86,866	80,536	113,958	6,367	1,822	14,028	15,852	319,428
1999	85,319	72,719	90,871	5,228	1,653	12,253	13,716	281,759
2000	84,615	96,364	96,822	4,316	2,074	12,763	16,373	313,327
2001	91,718	96,814	111,546	3,976	1,252	9,535	16,992	331,834
Average	52,973	85,067	103,682	18,909	1,804	12,568	14,633	288,298
STD deviation	14,942	17,413	28,001	9,053	414	3,163	4,762	40,131

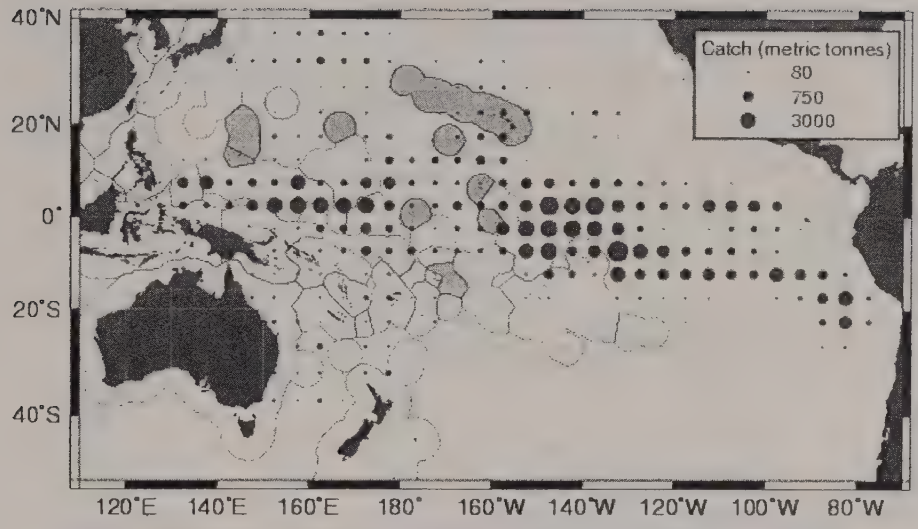


Figure 5. Distribution of longline catches of bigeye tuna reported in 2001. Source: SPC public domain data.

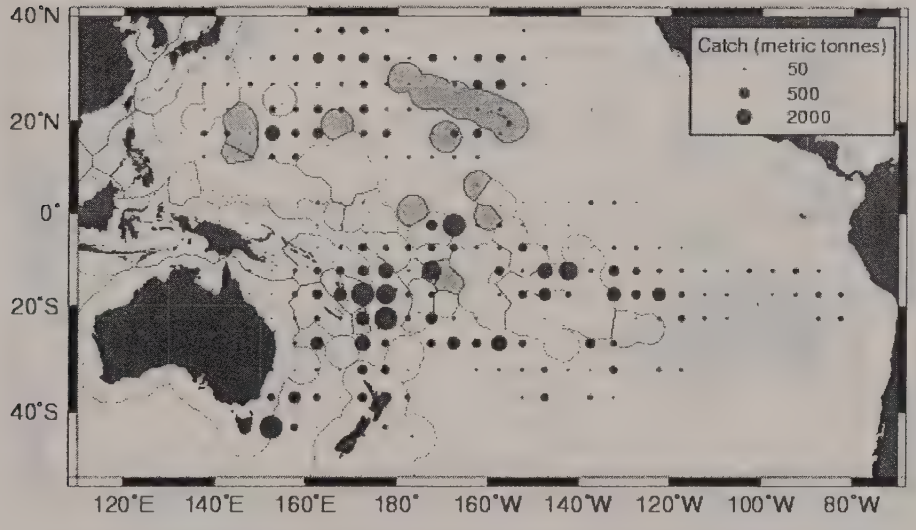


Figure 6. Distribution of longline catches of albacore tuna reported in 2001. Source: SPC public domain data.

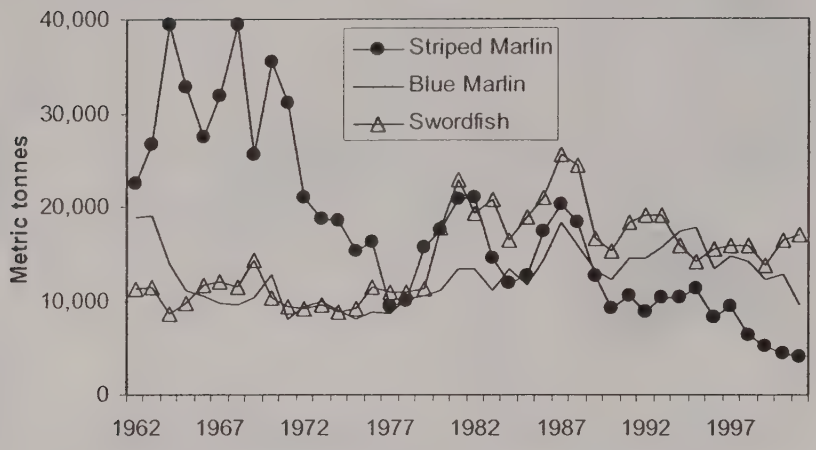


Figure 7. Reported longline billfish catches in the Pacific Ocean. Source: SPC public domain data.

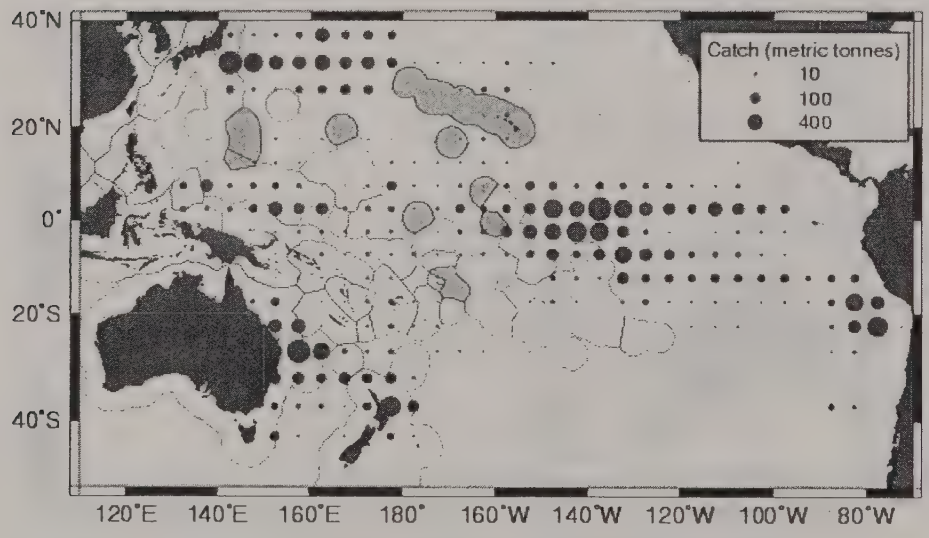


Figure 8. Distribution of longline catches of swordfish reported in 2001. Source: SPC public domain data.

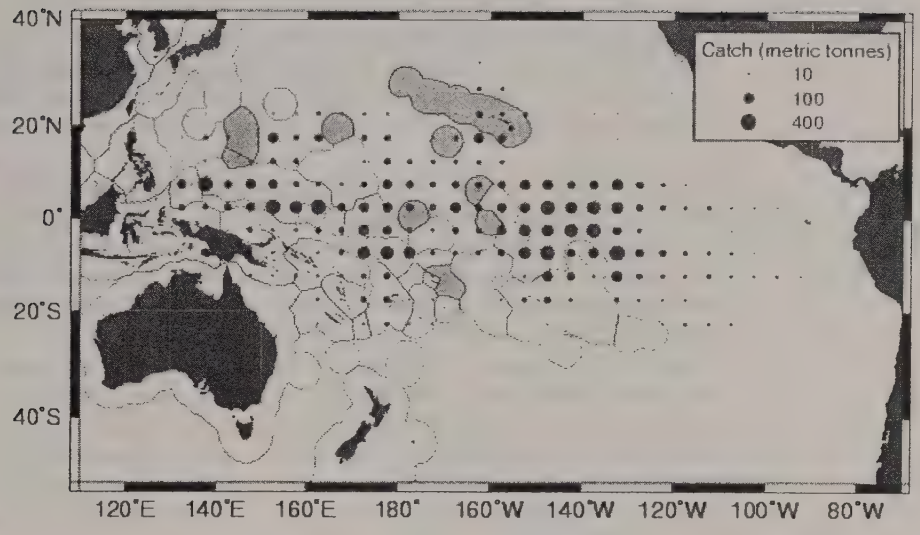


Figure 9. Distribution of longline catches of blue marlin reported in 2001. Source: SPC public domain data.

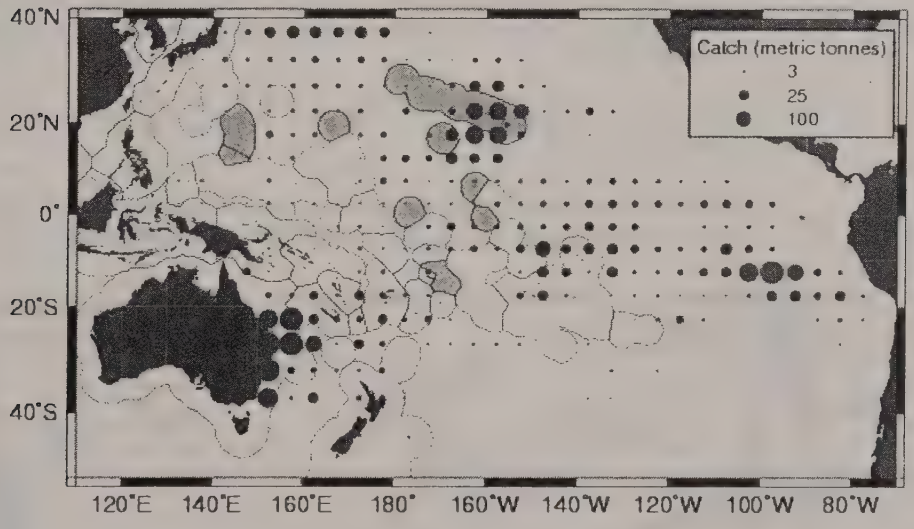


Figure 10. Distribution of longline catches of striped marlin reported in 2001. Source: SPC public domain data.

The 2002 pole-and-line fishery

Vessels

The pole-and-line fleet was composed of approximately 1,400 vessels in the 2002 WCPO fishery. Most of the vessels operated in the domestic fisheries in Indonesia and Japan. Over 100 vessels operate in Pacific Island countries and there are 160 vessels in the Japanese distant-water fleet.

Catch

The preliminary pole-and-line catch estimate for 2002 (330,993 mt–17% of total WCPO catch) is a slight increase on the 2001 level (324,800 mt), although the Japanese fleet catch estimate for 2002 has yet to be provided. As in previous years, skipjack accounts for the vast majority of the catch (84%); albacore taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific (9%), yellowfin (5%) and a small component of bigeye (1%) make up the remainder of the catch. The Japanese distant-water and offshore (130,497 mt in 2001) and the Indonesian fleets (182,545 mt in 2002) typically account for most of the WCPO pole-and-line catch. The Solomon Islands fleet (9,652 mt) continues to recover from low catch levels experienced in recent years (only 2,692 mt in 2000), but was still far from the level (of over 20,000 mt annually) experienced in most years of the 1990s.

Fleet distribution

The WCPO pole-and-line fishery has three components:

the year-round tropical skipjack fishery, mainly involving the domestic fleets of Indonesia, Solomon Islands and French Polynesia, and the distant water fleet of Japan,

seasonal sub-tropical skipjack fisheries in the home waters of Japan and Australia

a seasonal albacore/skipjack fishery east of Japan (June to November) occurs as an extension of the Japanese homewater fishery.

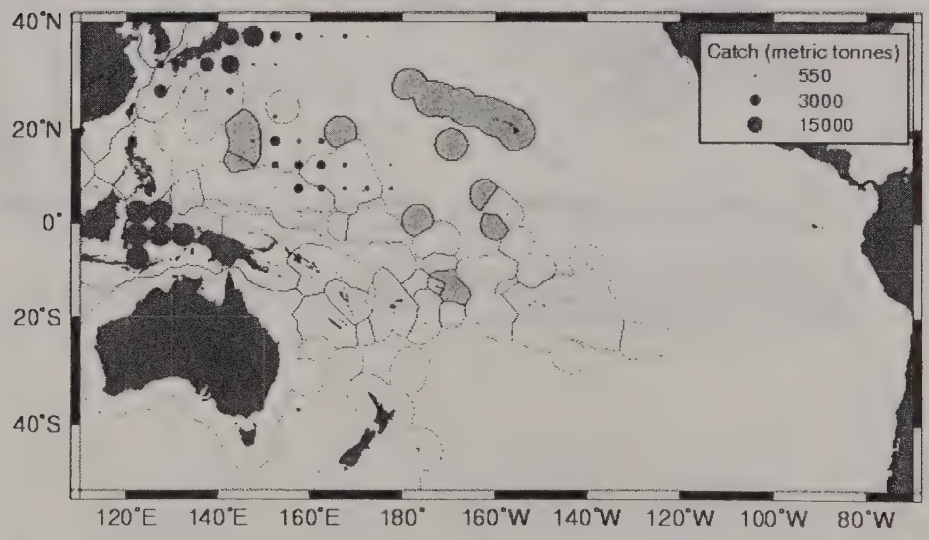


Figure 11. Distribution of pole-and-line catch of skipjack reported in 2001. Source: SPC public domain data.

Table 3. Total reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SCTB16 report.

Year	Skipjack
1970	197,873
1971	180,945
1972	172,871
1973	253,065
1974	289,202
1975	218,271
1976	276,581
1977	294,641
1978	331,401
1979	283,494
1980	332,465
1981	294,187
1982	262,233
1983	299,762
1984	379,474
1985	250,010
1986	336,694
1987	262,467
1988	301,031
1989	289,706
1990	224,591
1991	289,022
1992	233,283
1993	278,158
1994	238,317
1995	275,053
1996	239,894
1997	261,360
1998	294,286
1999	282,500
2000	304,005
2001	275,584
2002	280,578
Average	272,212
STD deviation	43,984

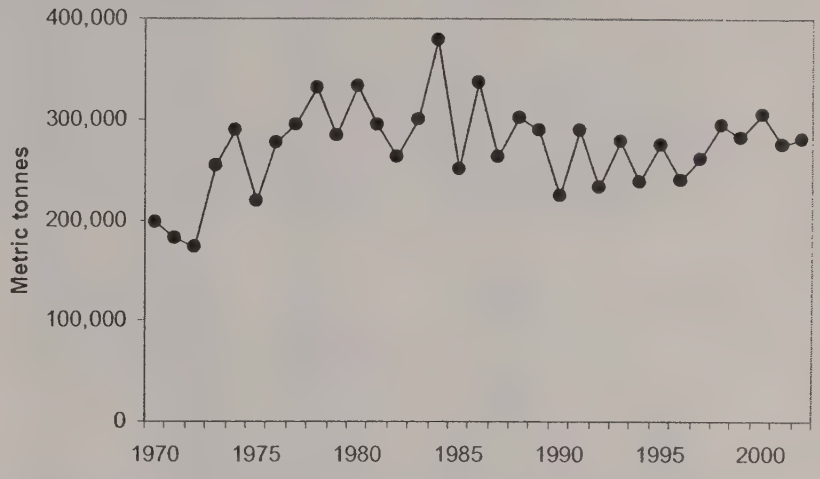


Figure 12. Reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SCTB16 report.

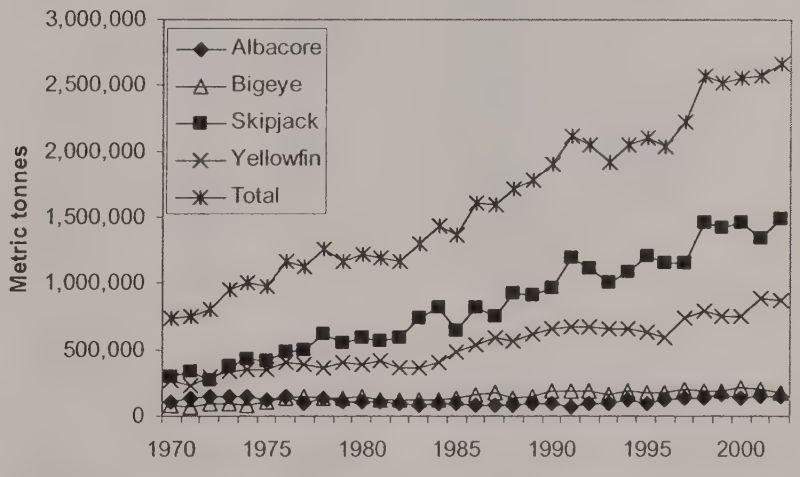


Figure 13. Estimated total annual catch of tuna species in the Pacific Ocean. Source: SCTB16 report.

Table 4. Estimated annual catch (metric tonnes) of tuna species in the Pacific Ocean. Source: SCTB16.

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1970	102,244	73,708	298,105	262,084	736,141
1971	127,786	71,866	331,098	225,244	755,994
1972	143,853	89,820	269,166	300,056	802,895
1973	145,238	94,787	370,502	339,861	950,388
1974	147,889	84,027	434,165	344,809	1,010,890
1975	116,827	105,721	412,386	344,838	979,772
1976	149,611	137,475	484,196	397,225	1,168,507
1977	98,670	153,510	490,583	387,728	1,130,491
1978	135,744	139,586	620,379	365,022	1,260,731
1979	100,763	128,700	543,339	395,186	1,167,988
1980	107,791	141,524	589,095	382,323	1,220,733
1981	105,960	115,904	557,795	415,057	1,194,716
1982	99,261	115,480	589,861	355,201	1,159,803
1983	80,125	122,193	741,976	358,700	1,302,994
1984	95,433	115,681	816,098	403,832	1,431,044
1985	90,607	138,500	649,346	485,809	1,364,262
1986	81,934	164,975	820,421	533,983	1,601,313
1987	78,569	177,215	748,297	591,139	1,595,220
1988	86,402	139,988	926,923	561,917	1,715,230
1989	97,151	147,698	910,626	619,622	1,775,097
1990	91,362	191,416	963,807	657,373	1,903,958
1991	71,608	183,678	1,193,042	669,555	2,117,883
1992	92,026	181,421	1,106,597	672,476	2,052,520
1993	88,994	160,159	1,006,734	655,678	1,911,565
1994	114,318	188,675	1,088,505	659,637	2,051,135
1995	99,633	175,270	1,199,625	629,929	2,104,457
1996	113,886	175,461	1,149,603	593,389	2,032,339
1997	138,889	200,875	1,148,073	736,045	2,223,882
1998	139,502	186,016	1,459,480	783,516	2,568,514
1999	164,335	183,217	1,417,863	748,736	2,514,151
2000	132,184	217,649	1,462,204	752,612	2,564,649
2001	147,133	200,305	1,337,078	884,514	2,569,030
2002	140,700	173,180	1,480,058	865,648	2,659,586
Average	112,922	147,748	836,880	526,629	1,624,178
STD deviation	25,448	39,689	374,432	183,355	589,425

Stock status and WPRFMC reference points

This section contains a brief review of the stock status for several pelagic species and the status of these stocks in relation to WPRFMC overfishing criteria. Stock assessments are presented annually at the Standing Committee on Tuna and Billfish (SCTB). In July 2003, the SCTB16 reviewed assessments for skipjack, yellowfin and bigeye tuna in the WCPO and south Pacific albacore. In addition, recent assessments are available for Pacific blue marlin and north Pacific blue shark and swordfish (Table 5 and 6). Stock status for the four tuna species are summarized from the SCTB species summary statements (www.spc.int/OceanFish/Html/SCTB/SCTB16/Execsum.pdf), which also contains additional information on recent developments in the fishery, sizes of fish and trends in CPUE, recruitment, biomass and fishing mortality.

Amendment 10 of the WPRFMC Pelagic FMP provided new specifications of overfishing criteria and control rules that trigger Council action based on the status of pelagic stocks. Amendment 10 defined Maximum Sustainable Yield (MSY) as a control rule that specifies the relationship of Fishing Mortality (*F*) to Biomass (B) and other indicators of productive capacity under a MSY harvest policy. Because fisheries must be managed to achieve optimum yield, not MSY, the MSY control rule is a benchmark control rule rather than an operational one. However, the MSY control rule is useful for specifying the "objective and measurable criteria for identifying when the fishery to which the plan applies is overfished" that are required under the MSA. The National Standard Guidelines (50 CFR 600.310) refer to these criteria as "status determination criteria" and state that they must include two limit reference points, or thresholds: one for *F* that identifies when overfishing is occurring and a second for *B* or its proxy that indicates when the stock is overfished (Figure 14). The status determination criterion for *F* is the maximum fishing mortality threshold (MFMT). Minimum stock size threshold (MSST) is the criterion for *B*. If fishing mortality exceeds the MFMT for a period of one year or more, overfishing is occurring. If stock biomass falls below MSST in a given year, the stock or stock complex is overfished. A Council must take remedial action in the form of a new FMP, an FMP amendment, or proposed regulations when it has been determined by the Secretary of Commerce that overfishing is occurring, a stock or stock complex is overfished, either of the two thresholds is being approached, or existing remedial action to end previously identified overfishing has not resulted in adequate progress.

Table 5. Schedule of completed and anticipated stock assessments for WPRFMC PMU

Albacore Tuna (S. Pacific)	2003	Pelagic Thresher Shark	
Bigeye Tuna (WCPO)	2003	Shortfin Mako Shark	
Kawakawa		Longfin Mako Shark	
Skipjack Tuna (WCPO)	2003	Blue Shark (N. Pacific)	2001
Wahoo		Silky Shark	
Yellowfin Tuna (WCPO)	2003	Oceanic Whitetip Shark	
Bluefin Tuna (Notthern)	2004	Salmon Shark	
Other tuna relatives (*Auxis* sp.)		Bigeye Thresher Shark	
(*allothunnus* sp., *Scomber* sp.)		Common Thresher Shark	
Black Marlin			
Blue Marlin	2002	Mahimahi	
Sailfish		Oilfishes	
Shortbill Spearfish		Opah	
Striped Marlin	2004	Pomfrets	
Swordfish (N. Pacific)	2001		

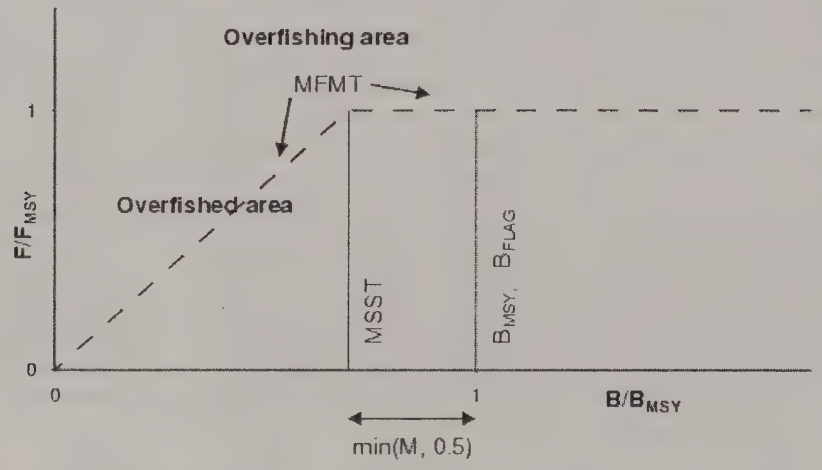


Figure 14. Specification of reference points F/F_{MSY} and B/B_{MSY} in the WPRFMC Pelagic FMP.

Stock status – WCPO skipjack tuna

Estimated biological reference points, particularly $B_{Current}/B_{MSY}$ and $F_{current}/F_{MSY}$, indicate that the skipjack tuna stock of the WCPO is not overfished owing to recent high levels of recruitment and a modest level of exploitation relative to the stock's biological potential (Figure 15, Table 6). Continued catches at the 1.2 million mt level is sustainable with continued high levels of recruitment, which are believed to be determined by principally environmental factors and not owing to a strong spawner-recruit relationship.

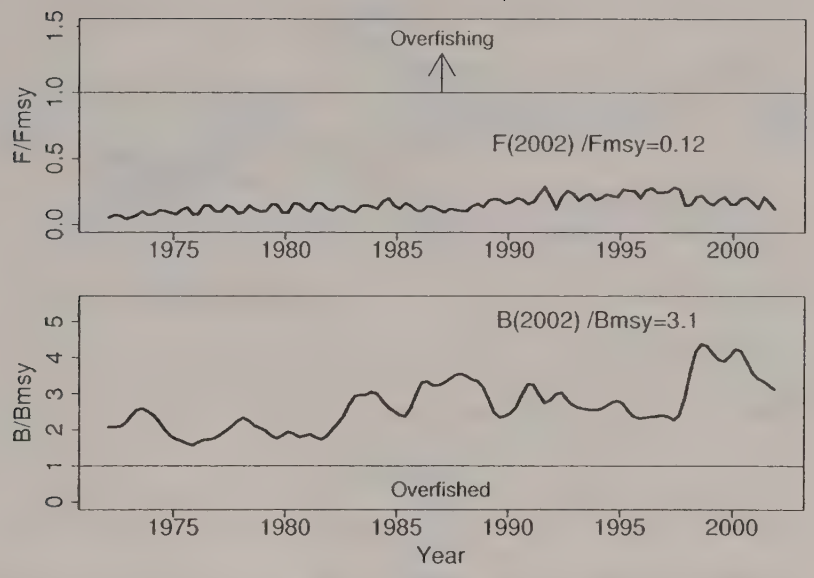


Figure 15. Skipjack tuna. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom). The horizontal lines at 1.0 in each case indicate the overfishing (top) and overfished state (bottom) reference points.

Stock status – WCPO yellowfin tuna

The assessment reviewed by SCTB16 reaffirms the result of the previous assessment that the yellowfin stock in the WCPO is presently not being overfished ($F/F_{MSY} < 1$) and that it is not in an overfished state ($B/B_{MSY} > 1$, Figure 16, Table 6). However, the stock is likely to be nearing full exploitation and any future increases in fishing mortality would not result in any long-term increase in yield and may move the yellowfin stock to an overfished state. While biomass-based reference points indicate that the long-term average biomass should remain above that capable of producing MSY if present catches are maintained, yield estimates indicate that there may be limited potential to expand long-term catches from the fishery at the current pattern of age-specific selectivity. The assessment also indicates that the equatorial regions are likely to be fully exploited, while the temperate regions are likely to be underexploited. While these spatial patterns of exploitation remain uncertain, if true, this may indicate the potential need for different management in different regions. Furthermore, the attribution of depletion to various fisheries or groups of fisheries indicates that the Indonesian fishery has the greatest impact, particularly in its home region. The purse seine fishery also has high impact, particularly in the equatorial regions.

While recognizing continuing uncertainties associated with the present stock assessment, the SCTB reiterates the previous recommendation that there be no further increases in fishing mortality (particularly on juvenile yellowfin) in the WCPO. If future evidence supports a shift to a lower productivity regime, a decrease in total catch would be anticipated in order to maintain the stock at sustainable levels.

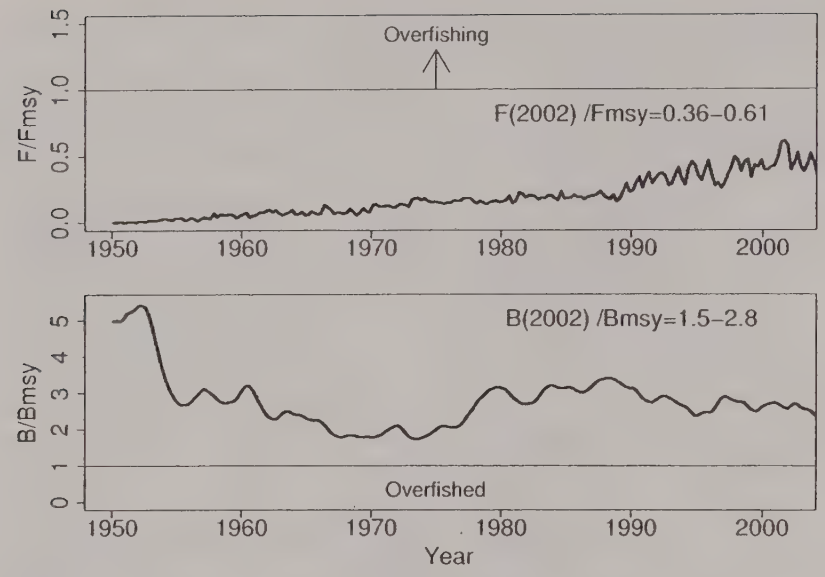


Figure 16. Yellowfin tuna. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom). The horizontal lines at 1.0 in each case indicate the overfishing (top) and overfished state (bottom) reference points.

Stock status – WCPO bigeye tuna

The bigeye assessment results of this year are both uncertain and for key management benchmarks, inconsistent with the bigeye assessment presented at SCTB 15 (Figure 17, Table 6). In particular, the SCTB 15 assessment concluded that overfishing was not occurring ($F_{current}/F_{MSY}$), while this year's assessment concluded that overfishing is occurring ($F_{current}/F_{MSY}$). Given that it is unlikely that the true status of the bigeye stock has changed so dramatically, as indicated by changes since last year, the Group cannot discount last year's assessment. Consequently, caution should be exercised in using the bigeye assessment results for management purposes until such time that these issues can be resolved. The current stock status was assessed by the yield curve and a range of reference points. The analyses indicated that the current F is larger than FMSY. However, the current biomass remains higher than BMSY. In other words, overfishing is occurring, but the stock is not yet overfished because of the recent above-average recruitment. Overall, the longline fishery has had the largest impact on the stock, and later development of the purse seine fishery and increases in the Philippines and Indonesian catch have also had high impact on the stock. In this regard, the assessment results are consistent with those from a Pacific-wide assessment as well as the current status of the stock in the eastern Pacific. The current level of exploitation appears not to be sustainable in the long term, unless the high recent recruitment is continued in the future. Therefore, the Group believes that there should be no further increase in the fishing mortality rate for bigeye tuna, until the results is further confirmed. The Group noted, however, while recognizing the current uncertainty in the stock assessments, all the stock assessment results conducted this year were more pessimistic than the last year's. If further assessments confirm the concern derived from this year's results, the managers should consider practical management action to prevent further decline of stock.

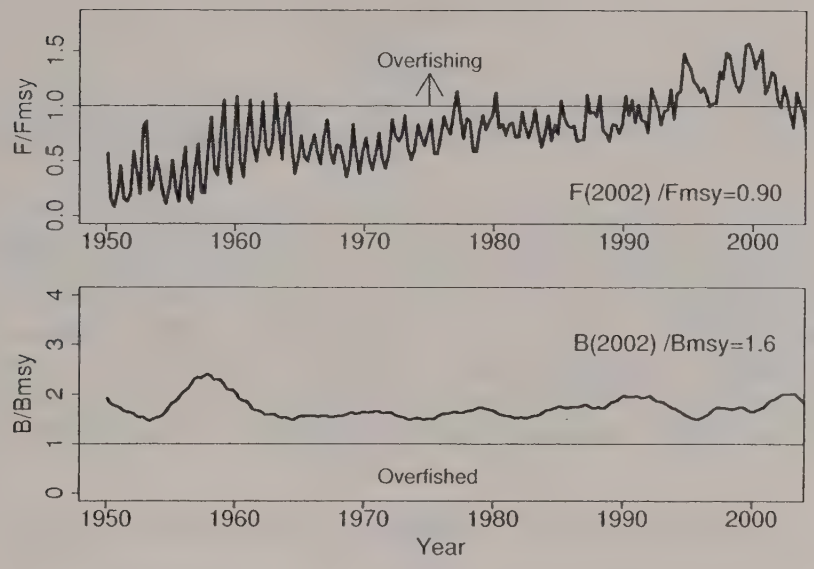


Figure 17. Bigeye tuna. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom). The horizontal lines at 1.0 in each case indicate the overfishing (top) and overfished state (bottom) reference points.

Stock status – south Pacific albacore tuna

The current stock assessment was conducted with MULTIFAN–CL. The fishery for albacore is unique in that it has exhibited no significant trend in catches over the period of 1960 – 1995. Due to the problems faced by all assessments conducted with limited data on stocks, which have been apparently exploited at only low exploitation rates over the period of the fishery, the results obtained provide little information on the biomass of the stock. Improved results from this model would be expected if there were better return rates of tags placed on albacore. An analysis based on a Schaefer production model provided an estimate of MSY, but the Group considered that this methodology requires further review before it can be used to provide advice on stock status. The assessment gave similar results to last year's assessment, with a low impact of fishing on biomass, and indicated that the current biomass is at about 60% of unfished levels. It is therefore unlikely that the stock is being overfished or is in an overfished state (Figure 18, Table 6).

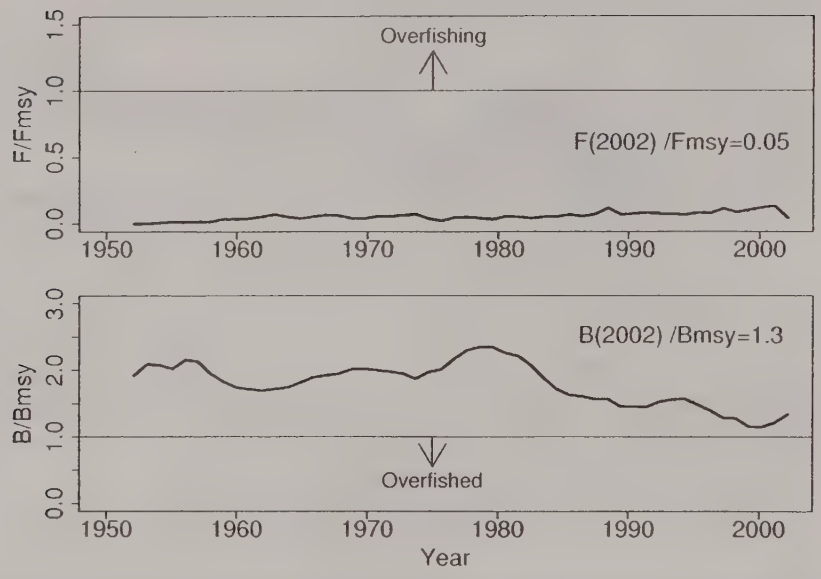


Figure 18. South Pacific albacore tuna. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom). The horizontal lines at 1.0 in each case indicate the overfishing (top) and overfished state (bottom) reference points.

Table 6. Estimates of overfishing and overfished reference points for WPRFMC PMUS.

Stock	Overfishing reference point	Is overfishing occurring?	Overfished reference point	Is the stock overfished?
Skipjack Tuna (WCPO)	F_{2002}/F_{MSY}=0.12	No	B_{2002}/B_{MSY}=3.1	No
Yellowfin Tuna (WCPO)	F_{2002}/F_{MSY}=0.71.-0.91	No	B_{2002}/B_{MSY}=1.41-1.74	No
Albacore Tuna (S. Pacific)	F_{2002}/F_{MSY}=0.05	No	B_{2002}/B_{MSY}=1.3	No
Bigeye Tuna (WCPO)	F_{2002}/F_{MSY}=1.11.-2.0	Yes (2003); No (2002)	B_{2002}/B_{MSY}=1.35-1.72	No
Blue Marlin (Pacific)	F_{1997}/F_{MSY}=0.50	No	B_{1997}/B_{MSY}=1.4	No
Swordfish (N. Pacific)	F_{2001}/F_{MSY}=0.06	No	B_{2001}/B_{MSY}=1.3	No
Blue Shark (N. Pacific)	F_{1999}/F_{MSY}=0.01	No	B_{1999}/B_{MSY}=1.9	No
Other Billfishes	Unknown		Unknown	
Other Pelagic Sharks	Unknown		Unknown	
Other PMUS	Unknown		Unknown	

Appendix 6

Marine Recreational Fisheries of the Western Pacific Region

Introduction

Fishing, either for subsistence or recreation continues to be an extremely important activity throughout the Western Pacific Region in the four major populated island areas of the Western Pacific Region, Hawaii, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands (CNMI). Fish consumption in Micronesia and Polynesia typically averages about 130 lb/per capita/yr (Dalzell et al 1996) and even in more culturally diverse Hawaii, fish consumption is almost three times the US national average at about 42 lb/person/yr (Dalzell & Paty 1996).

Recreational fisheries in the Western Pacific Region

In Hawaii, recreational shoreline fishing was more popular than boat fishing up to and after WW II. Boat fishing during this period referred primarily to fishing from traditional canoes (Glazier 2000). All fishing was greatly constrained during WW II through time and area restrictions, which effectively stopped commercial fishing and confined recreational fishing to inshore areas (Brock 1947). Following WWII, the advent of better fishing equipment and new small boat hulls and marine inboard and outboard engines led to a growth in small vessel-based recreational fishing.

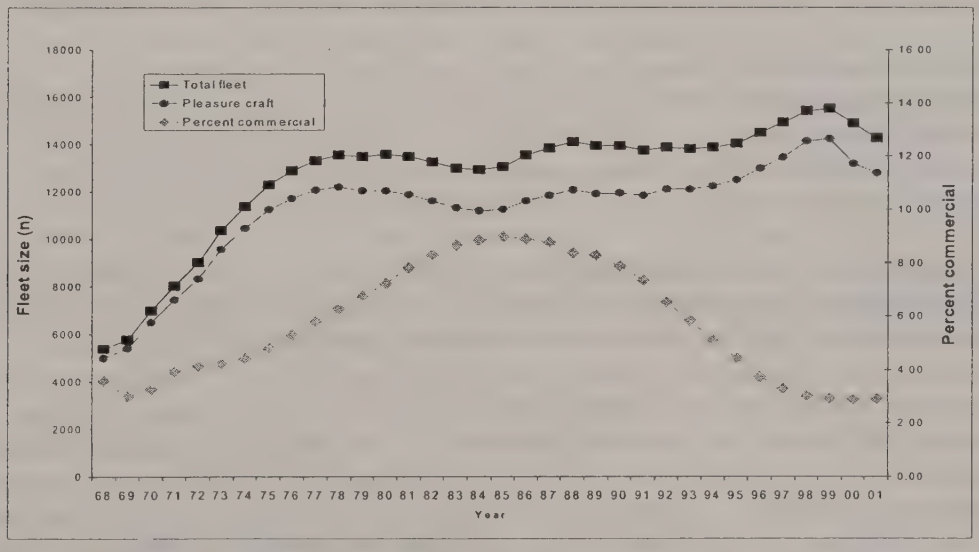


Figure 1. Annual number of small vessel fleet registratins in Hawaii. Figure shows total fleet size, and percentage of vessels being registered for commercial fishing (Source: Hawaii Division of Boating and Ocean Resources)

A major period of expansion of small vessel recreational fishing occurred between the late 1950s and early 1970s, through the introduction of fibreglass technology to Hawaii and the further refinement of marine inboard and outboard engines (Figure 1). By the early 1960s there were an estimated 5,300 small boats in the territory being used for recreational fishing. By the 1980s the number of recreational or pleasure craft had risen to almost 13,000 vessels and to about 15,000 vessels in the 1990s. There are presently some 26 fishing clubs in Hawaii, and a variety of different recreational fishing tournaments organized both by clubs and independent tournament organizers. Hawaii also hosts between 150 to 200 boat based fishing tournaments, about 30 of which are considered major competitions, with over 20 boats and entry fees of ≥$100. This level of interest in recreational fishing is sufficient to support a local fishing magazine, Hawaii Fishing News, which besides articles of interest to recreational fishermen, includes a monthly roundup of the fishing activity and conditions at the major small boat harbors in the State. Further, a directory of the State's small boat harbors and launching ramps is published annually by Hawaii Ocean Industry and Shipping news (see December 2002/January 2003 issue).

Elsewhere in the region, recreational fishing is less structured. In Guam fishing clubs have been founded along ethnic lines by Japanese and Korean residents. These clubs had memberships of 10-15 people, along with their families. Four such clubs were founded in Guam during the past 20 years, but none lasted for more than a 2-3 years (Gerry Davis, Guam DAWR pers. comm.). These was also a Guam Boating Association comprising mostly fishermen, with several hundred members. This organization functioned as a fishing club for about 10 years and then disbanded. Some school groups and the boy scouts have formed fishing clubs focused on rod and reel fishing, and there is still one spearfishing club that has only a handful of members, but appears to be still be active. There are also some limited fishing tournaments on Guam, including a fishing derby for children organized by the local Aquatic and Wildlife Resources Division (Anon 2000).There are few fishing clubs in the in the Northern Mariana Islands. The Saipan Sportfishing Association (SSA) has been in existence for at least 16 years, and is the sponsor of the annual Saipan International Fishing Tournament, which is usually held in August or September. In 1997, the SSA listed approximately 40 members. There is also a Tinian Sportfishing Association, but the status of this club is unknown at this time.

The founding of the American Samoa Game Fishing Association in 1974 in Pago Pago led to fishing tournaments being held on a regular basis in the territory (Tulafono 2001). A total of 64 tournaments, averaging two to three tournaments per year and 10 to 20 vessels in each competition, were conducted in Pago Pago between 1974 and 1998. However interest in fishing tournaments waned during the late 1990s, with only three vessels participating in the last tournament held in 1998. The reason for this decline was not entirely clear, but may be related to the expansion of the longline fishery in American Samoa and the shift from commercial trolling to longlining. According to Tulafono, fishermen were more interested in earning income and it was time consuming to switch from longline to troll gear for a weekend of tournament fishing. Tulafono (2001) noted that tag and release programs, which are gaining popularity with recreational and charter-vessel fishermen elsewhere in the U.S., would not be popular in American Samoa. In common with many Pacific islands, fish were caught to keep for food in

American Samoa, and fish landings and their distribution through the community were important in order to meet social obligations. Releasing fish would be considered a failure to meet these obligations (Tulafono 2001).

There is also some recreational fishing activity at some of the Pacific Remote Island Areas (PRIAs), namely at Midway, Wake, Johnston and Palmyra Islands. There are no resident populations at Howland & Baker and Jarvis Islands and fishing activity at these locations is likely minimal. There was a tourist facility at Midway until 2002, which operated a charter boat fishery targeting primarily pelagic fish at Midway Atoll. The company operated five vessels using for charter fishing at Midway: three 22-26 ft catamarans for lagoon and nearshore fishing operations and two 38 ft sportfishing vessels used for blue water trolling. In addition there were approximately seven small vessels maintained and used by Midway residents for recreational fishing. Of this total, three vessels engaged primarily in offshore trolling for PMUS including yellowfin tuna, ono and marlin. All vessels fishing at Midway were required to file a float plan prior to a fishing trip and complete the "Midway Sports Fishing Boat Trip Log" upon completion of each trip. The US Fish and Wildlife Service was responsible for compiling these catch data.

At Palmyra Atoll, an island privately owned by The Nature Conservancy, a 22 ft catamaran is used for offshore trolling and four small boats operated within the lagoon used for bonefish angling. There are several craft used for recreational fishing at the two military bases on Johnson and Wake Islands. These include eight Boston whalers, two cabin cruisers and a landing craft at Johnson, and two landing craft and two small vessels at Wake.

Recreational fisheries in the Western Pacific Region

Estimates of recreational catch for the Western Pacific are given in Table 1. The data for Guam, Northern Mariana Islands and American Samoa are based on the proportion of catches landed for sale and catches retained and not sold, in all landings sampled by creel surveys in each area. The ratio of unsold to sold catch in the samples was used in conjunction with the total catch estimate expanded from the creel survey data. This was adjusted downwards based on the creel surveys by the ratio of landings by vessels retaining 100 % of their catch to the total unsold catch. This accounts for that fraction of the catch not sold by commercial fishing vessels. The volume of fish landed by vessels retaining all their catch was labeled the nominal recreational catch. A similar exercise is conducted by the Honolulu Laboratory to generate recreational catch figures for Hawaii.

Table 1. Estimated recreational fish catches in the four principal island groups of the Western Pacific Region

Location	Year	Total catch (lbs)	Unsold catch (lb)	Nominal recreational catch (lb)	Recr. catch as % of total catch	Total trips[3]	Recr. fishing trips	Recr. trips as % of total trips
American Samoa[1]	2002	887,968	NA	46,462	5.2	2704	192	7.1
Guam	2002	961,668	479,303	419,486	43.6	15,716	9,708	61.8
Hawaii[2]	2002	38,333,962	NA	12,932,744	33.7	406,826	378,729	93.1
NMI	2002	578,148	97,536	90,374	15.6	6,036	2,222	36.8

1.Alia catamarans and small boats only. total commercial catch for American Samoa in 2002 was 15.4 million lbs
2.Hawaii recreational catch from NMFS Honolulu Laboratory. recreational fishing trips as a percent of total trips based on Hamilton & Huffman 1997
3. Boat based fishing only

Charter vessel sportsfishing

Tables 2-6 present summaries of the charter vessel sportsfishing in the Western Pacific. Most charter fishing in Hawaii is focused on catching blue marlin, which in 2002 formed about 50 % of the total annual charter vessel catch by weight (Table 3). Although commercial troll vessels also take blue marlin, these only form about a quarter of their catch, with the majority of the target species being yellowfin, mahimahi, aku and ono (Table 3). Unlike other parts of the US, there is little recreational fishery interest in catching sharks in Hawaii.

Guam has a charter fishing sector, which unlike Hawaii caters for both pelagic and bottomfish fishing. Until recently the troll charter fishery was expanding, but, over the past three years the number of vessels involved, and level of fishing, has decreased in response to lower tourist volume from Japan due to the Asian economic recession in the late 1990s. Nonetheless, although compromising only 5 % of Guam's commercial troll fleet, the Guam troll charter industry accounts for 11% of the troll catch and 25 and 20% of the Guam blue marlin and mahi mahi catch respectively. (See Guam module in this volume). The Guam bottomfish charter fishery has continued to increase despite the drop in tourist volume from Japan, and accounts for about 10% of Guam's bottomfish fishing effort. The primary catch of the bottomfish charter fishery are goatfish and triggerfish, which are mostly released.

Charter fishing in NMI is limited, with about ten boats operating on Saipan, and a few vessels on Tinian conducting occasional fishing charters. Tourism is not a significant component of the American Samoa economy, and hence there is little charter fishing activity. There are few vessels suitable for charter-type operations and the American Samoa government does not actively promote tourism and sportfishing as the local infrastructure for this is limited (Tulafono 2001).

Table 2. Estimated catches by pelagic charter fishing vessels in Guam, Hawaii and Northern Mariana Islands in 2002

Location	Catch (lb)	Effort (trips)	Species
Guam	46,947	1,421	blue marlin, skipjack, mahimahi, wahoo
Hawaii	413,893	6,120	mahimahi, yellowfin, wahoo, blue marlin
Northern Mariana Is	11,690	297	mahimahi, yellowfin, skipjack, wahoo

Charter vessel fishing in the Western Pacific Region has elements of both recreational and commercial fishing. The primary motivation for charter patrons is recreational fishing, with the possibility of catching large game fish such as blue marlin. The charter vessel skipper and crew receive compensation in the form of the patrons fee, but are also able to dispose of fish on local markets, as is the case in Hawaii. The catch composition of charter vessel catch versus conventional commercial trolling in Hawaii, reflects the different targeting in the two fisheries. Blue marlins are the dominant feature of charter vessels in Hawaii, while in Guam (Tables 3 & 4), composition of the charter cath is being broadly similar to the mix of species in the commercial troll catches

Table 3. Comparison of species composition of landings made by Hawaii pelagic charter vessels versus commercial troll vessels in 2002

Species	Charter vessels		Commercial trollers	
	Landings (lb)	Percent	Landings (lb)	Percent
Mahimahi	71,741	17.33	514,386	29.88
Skipjack Tuna	18,712	4.52	173,982	10.11
Wahoo	31,115	7.52	311,715	18.11
Blue Marlin	196,084	47.38	215,365	12.51
Yellowfin Tuna	57,633	13.92	375,431	21.81
Others	38,069	9.33	130,569	7.58
Total Pelagics	413,893	100.00	1,721,448	100.00

Table 4. Comparison of species composition of landings made by Guam pelagic charter vessels versus commercial troll vessels in 2002

Species	Charter vessels		Commercial trollers	
	Landings (lb)	Percent	Landings (lb)	Percent
Mahimahi	16,874	35.37	155,800	32.05
Skipjack Tuna	12,716	26.65	163,120	33.55
Wahoo	11,456	23.38	60,654	12.48
Blue Marlin	4,540	9.52	49,013	10.08
Yellowfin Tuna	1,730	3.63	43,202	8.89
Others	692	1.45	14,357	2.95
Total Pelagics	47,708	100.00	486,146	100.00

In Hawaii there is considerable variation in charter vessel catches between the various islands (Table 5), with the largest charter vessel fishery based on the island of Hawaii. In 2001, charter vessel catches on the island of Hawaii accounted for over half of the total charter vessel landings within the state, with Maui and Oahu charter vessels forming most of the remaining catch. The islands of Kauai and Molokai make minor contributions to the charter vessel catch, with no charter fishing on Lanai.

Table 5. Charter vessel catches in Hawaii by island during 2002

Island	Catch (lb)	Percent	Trips	Percent	CPUE (lb/trip)
Hawaii	269,120	65.02	3,260	53.27	82.55
Oahu	59,051	14.27	1,631	26.65	36.21
Maui	62,173	15.02	713	11.65	87.20
Kauai	23,550	5.69	516	8.43	45.64
Molokai*	NA		NA		NA
Lanai*	NA		NA		NA
Total	413,893	100.00		100.00	67.63

* DAR confidentiality protocols prevent reporting 2002 charter vessel activity for Molokai.

Most charter vessel fishing on the island of Hawaii is conducted from Kona's small boat harbor at Honokohau, and about two thirds of the charter vessel catch comprises blue marlin (Table 6). Elsewhere, mahimahi dominate charter vessel landings, with blue marlin comprising between 2% and 30% of catches. Other important species in the charter vessel catches, depending on location, comprise yellowfin, wahoo, spearfish and skipjack.

Table 6. Composition of charter vessel catches in the Main Hawaiian Islands during 2002

Hawaii			**Kauai**		
Species	**Landings (lb)**	**Percent**	**Species**	**Landings (lb)**	**Percent**
Blue marlin	162,882	60.52	Skipjack	6,579	27.93
Yellowfin	41,892	15.57	Yellowfin	6,359	27.00
Wahoo	14,989	5.57	Wahoo	4,489	19.06
Striped marlin	13,242	4.92	Mahimahi	3,894	16.54
Mahimahi	21,470	7.98	Blue marlin	495	2.10
Others	14,465	5.44	Other	1,735	7.37
Total	269,120	100.00	Total	23,550	100.00
Oahu			**Maui**		
Species	**Landings (lb)**	**Percent**	**Species**	**Landings (lb)**	**Percent**
Mahimahi	28,830	46.37	Blue marlin	21,215	35.93
Blue marlin	11,492	18.48	Mahimahi	17,547	29.71
Yellowfin	7,090	11.40	Wahoo	7,232	12.25
Skipjack	6,883	11.07	Striped marlin	5,293	8.87
Wahoo	4,405	7.09	Short-nose spearfish	1,482	2.51
Others	3,473	5.59	Others	6,336	10.73
Total	62,173	100.00	Total	59,051	100.00

Recreational Fishing Data Collection in Hawaii

The Hawaii Marine Recreational Fishing Survey Project

Mike Nelson (HDAR) and Maury Osborn, (NMFS Office of Science and Technology) assisted by Walter Ikehara (HDAR), developed a cooperative agreement with NMFS to initiate the Hawaii Marine Recreational Fishing Survey (HMRFS) in 2001. NMFS and HDAR contributed joint funding for intercept surveys and charter boat surveys on the islands of Oahu, Hawaii, and Maui. NMFS also funded the Random Digit Dialing household telephone survey via their national contractor beginning in January 2001. The HMRFS project commenced in July 2001, with Walter Ikehara as the HDAR coordinator and Mike Nelson as survey manager. Four surveyors were hired in the first year (July 2001 - June 2002) and began surveys of private boat and charter boat fishermen in late 2001. In December 2002 Dr. Matthew Parry took over as the HMRFS survey manager. The HMRFS continues to expand its effort and now consists of 7 surveyors (3 on Oahu, 2 on Maui, and 2 on Hawaii) and 1 data worker. The HMRFS hopes to begin surveying Kauai in 2004.

The MRFSS program uses a triple survey approach that has been developed over the 20+ years of its history. For each two-month survey period (wave) a random sample of households is called by telephone to determine how many have done any fishing in the ocean, their mode of fishing (private boat, rental boat, charter boat, or shoreline), what methods were used, and how much effort (number of trips and hours) was expended. Concurrently, surveyors are sent out to boat launch ramps, small boat harbors, and shoreline fishing sites to interview fishermen to fill out intercept survey forms. The intercept survey collects data on fishing area, fishing methods, trip/effort, species caught, and lengths and weights of fish. The sites are randomly selected, but stratified by fishing pressure so that the sites with the highest pressures are likely to be surveyed more often. In addition the charter boat operators are surveyed by a separate survey. This additional survey of the charter fleet serves the same function as the random digit dialing household survey and is necessary because out of town fishers that charter vessels wouldn't be covered by randomly calling the Hawaiian populace. The telephone and charter survey data are used to estimate total statewide fishing effort and the intercept surveys provide detailed catch and trip information. Data from the three surveys are combined and expanded by computer to yield statewide estimates of total effort and catch by species, mode, and county. For more information on the MRFSS program and survey methods, please go to the MRFSS web site (http://www.st.nmfs.gov/st1/recreational/). The 2002 data should be regarded with caution. Percent Standard Error (PSE) may be significant.

Weight estimates are minimums and may not reflect the actual total weight landed or harvested.

MRFSS weight estimates are calculated by multiplying the estimated number harvested in a cell (year/wave/state/mode/area/species) by the mean weight of the measured fish in that cell. Sometimes we have an estimate of harvest but no mean weight, either because

- the harvest is all reported by the anglers (B1), or

- because for some reason the interviewers couldn't weigh any fish (fish too big, already gutted and gilled, etc.).

If a cell is missing a mean weight OR the variance of the mean weight = 0 (e.g. only 2 weights & they are same), and if we have at least two fish measured in the state (all fishing areas and modes combined),

- We substitute the mean for the whole state for that wave.
- We need two measured fish to get a variance estimate.

After state substitution, if the mean weight is still missing,

- We use the mean from the whole subregion for that wave.
- The "two fish rule" still applies.
- Hawaii is only state in subregion, hence if state pooling results in missing mean weight then we give up (as below) and leave a missing weight estimate.

After subregional substitution, if the mean weight is STILL missing, we give up and leave a missing weight estimate. At that point,

- It is up to the user to determine whether to substitute, and
- What substitution is most appropriate to use (a mean from the preceding and following waves, the whole year, same wave over years, whole Atlantic & Gulf coast, some complicated regression model, whatever).
- We don't make those decisions because the information needs and sensitivity of the data vary among species.

The phenomenon of missing weights is more widespread with rarely caught species and with large fish (i.e. tunas). The existence and/or extent of missing weights for your query can be examined by requesting data at the cell level: (by year/wave/state/by mode/by area/by species (time series)).

Results

A synopsis of the results of the HMRFS project for the year 2002 is shown in Tables 7 and 8 and Figures 2 - 6. The total recreational catch for Hawaii was estimated to be 12,932,744 lbs, of which about 95% in terms of weight was caught from boats (Table 1). In terms of numbers of fish, roughly equal amounts are caught from boats versus shore-based fishing. Interestingly, pelagics comprise the largest volume of fish landed by weight from other fishing. Pelagic fish are caught from shore in Hawaii, particularly in locations where there is a steep drop-off, but whether the weight of pelagic fish landed from shore is uncertain and needs further clarification. Pelagic fish in total account for about 90% by weight of all recreationally caught fish landed in Hawaii. The HMRFS project also gives some insights into the volume of bycatch in recreational fishing. Live discards from pelagic fishing are small ranging from zero for shore-based fishing to one percent for boat based fishing. Live discards are higher for other species, ranging from about 5.5% for

boat based fishing to 10.8% for shoreline fishing. Overall the discard rate for all recreational fishing is about 6%. The higher discard rates for other species may be indicative in part of the increasing volume of jacks which are being tagged and released alive by recreational fishermen.

The contributions by the six major pelagic fishes caught by boat-based recreational fishing are shown in figures 2 and 3. Skipjack is the most commonly caught pelagic taken by recreational fishermen in terms of numbers, but only a minor fraction of the catch by weight. The biggest contributions in terms of catch by weight are yellowfin tuna, blue marlin, wahoo and mahi mahi. Recreational fishing activity in 2002 ranged from between 50,000 to 100,000 recreational trips per two month period (Figure 5), with a peak in fishing activity from September to December.

Table 7. Hawaii recreational catch in weight from boat-based and shoreline fishing, 2002

Fish	Catch (lb)	
	Boat fishing	Shoreline fishing
Pelagics	11,255,283	500,960
Other species	988,408	188,093
Total	12,243,691	689,053

Table 8. Hawaii recreational catch and live discards by number, 2002

Live discards	Boat			Shoreline fishing		
	Catch	Discards	%	Catch	Discards	%
Pelagics	677,836	6,772	1.00%	33,386	0	0.00%
Other spceies	168,530	9,215	5.47%	759,487	82,001	10.80%
Total	846,366	15,987	1.87%	792,873	82,001	10.34%

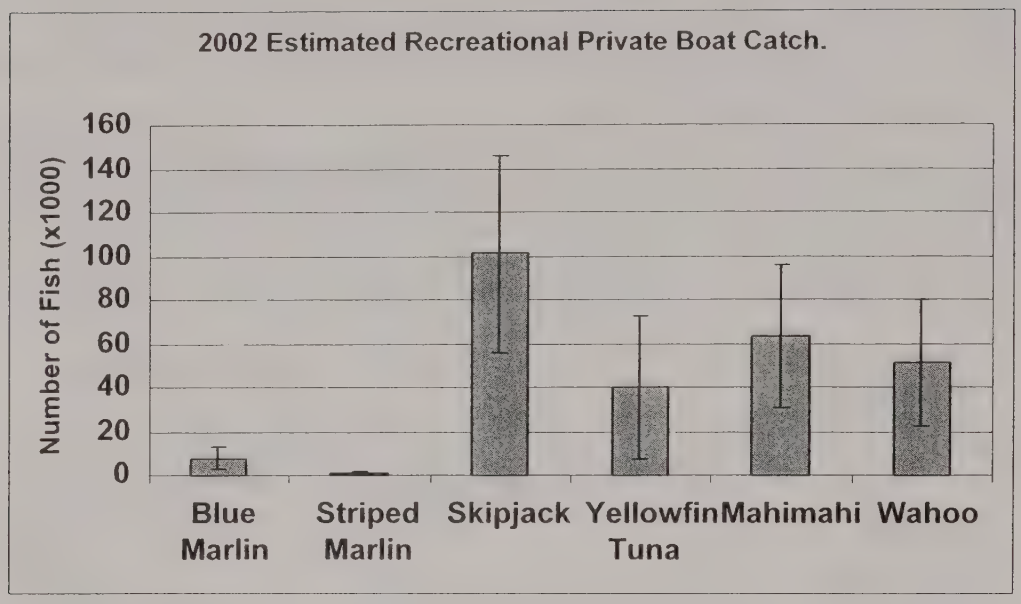


Figure 2. 2002 Estimated recreational private boat catch of PMUS species by number

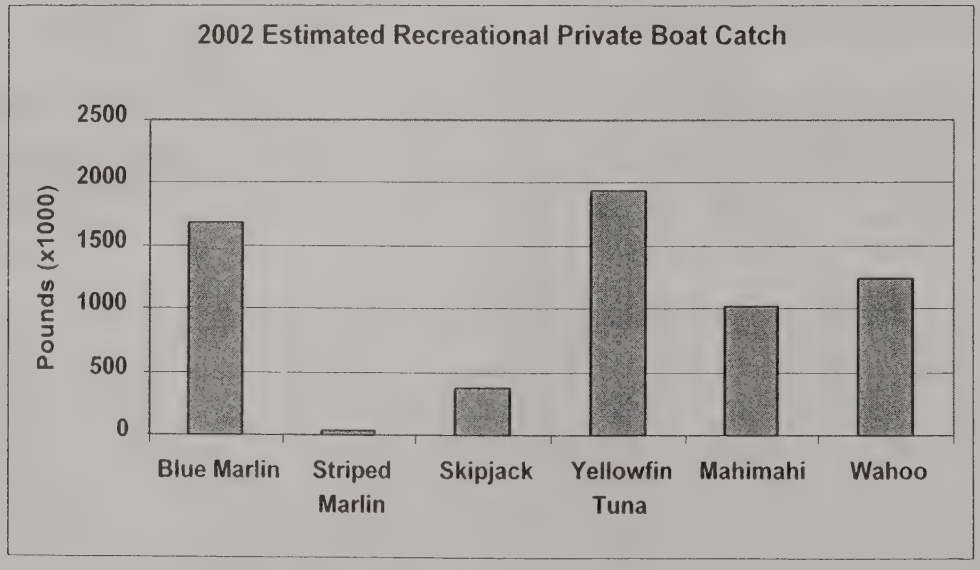


Figure 3. 2002 Estimated recreational private boat catch of PMUS species by weight.

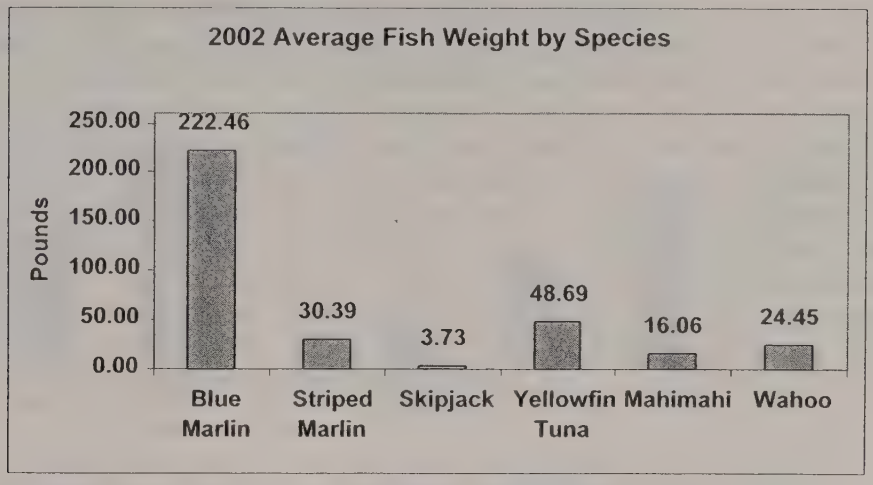


Figure 4. 2002 Average weight by species calculated from weight and number estimates.

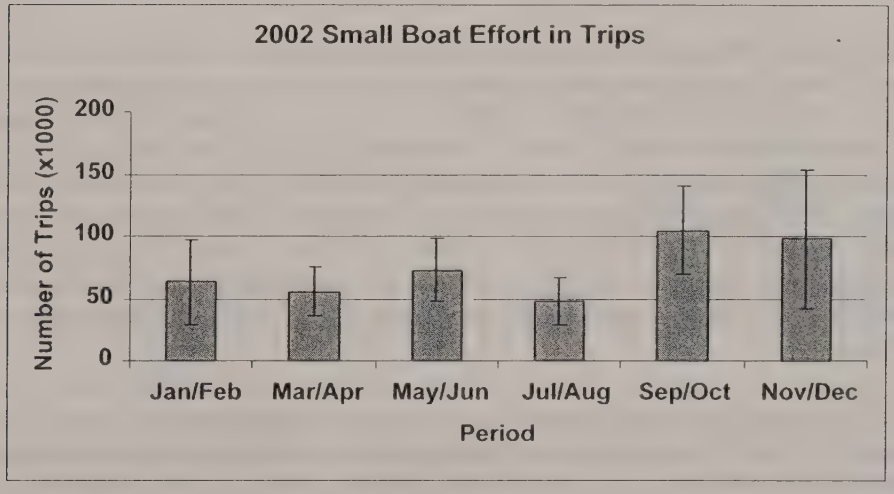


Figure 5. 2002 Recreational boat trips for all waters within EEZ boundary.

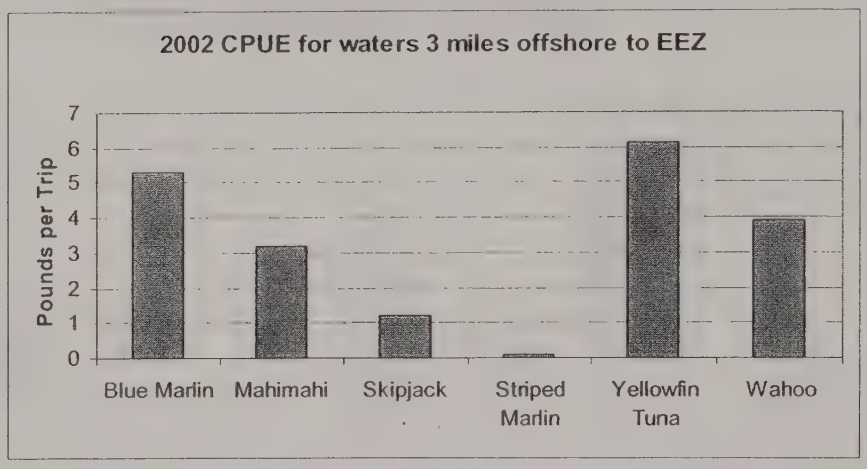


Figure 6. CPUE for PMUS in waters between 3 miles offshore and EEZ boundary

The NMFS/Council Pelagic Fisheries Research Program Recreational Fisheries Meta Data Project

The Recreational Meta Data Project was initiated to document and compile into database formats sources of Hawaii's pelagic recreational and sports fishing information from the past 50 years. Recreational fishery data has not been routinely collected in the State of Hawaii over the past 50 years, although there are several sources of information including previous recreational and small fishing boat surveys, boating registration data, angling club records, fishing tournament records, newspapers, and fishermen logbooks. Much of the existing literature is unpublished or "gray literature", and difficult for fishery scientists and researchers to obtain. This project has collected over 80 papers and reports and incorporated them as part of the database files. Further, the data tabulated therein has been re-entered into spreadsheet files so as to make them available to other researchers.

The project has also received information on 27 different fishing tournaments from 7 different angling and boat clubs and expects to obtain information covering an additional four more tournaments. Several of these tournaments are well documented and the project has amassed annual information covering over 40 years of catch and effort in Hawaiian waters. The number of boats participating in different tournaments has ranged from 6 to 260 boats. The majority of tournament catch is caught by fishing in association with Fish Aggregating Devices (FADs), which may provide valuable feedback to the Hawaii Division of Aquatic Resources (HDAR) in monitoring the success of its FAD deployment program, Pervious attempts by HDAR to monitor FAD performance through voluntary recreational fishery reporting have been unsuccessful.

Information on effort, catch, and tournament totals reflect the unique nature of each tournament's reporting procedures. Most tournaments do not differentiate between bigeye tuna (*Thunnus obesus)* and yellowfin tuna (*T. albacares*) and these species are listed simply as "ahi". Marlin reports can also be comprised of one or more billfish species, and skipjack tuna *(Katsuwonus pelamis*) may or may not be included in the radio logs and weigh in slips. The potential for constructing weight frequency charts from tournament radio logs to monitor size trends in tournament catches was investigated, but was confounded by the practice of rounding estimated weights in conjunction with species identification problems. Despite these limitations, this information does provide insight into hook up rates, catch composition, and average weight of catch. Time series catch rate data from a single tournament are also useful in elucidating cyclical peaks in species catch abundance. Although catching a thousand pound marlin continues to be a major goal of most tournament participants, catches of mahimahi (*Coryphaena hippurus*) and ahi are the mainstay of the tournament catches in Hawaii.

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Appendix 7

Pelagic fisheries production from the Pacific West Coast States

Introduction

The following tables include time series for pelagic fisheries production along the US West Coast between the early 1980s to 2001. The 1997 annual report discusses these trends in some detail and these explanations remain current.

Table 1. Annual West Coast highly migratory species landings (mt) by species

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Big-eye Thresher	Pelagic Thresher	Shortfin Mako	Blue shark
1982	5,410	61,769	41,904	968	2,404	1,112	1,848	0	28	351	27
1983	9,574	55,741	44,995	21	764	1,758	1,331	9	96	217	7
1984	12,657	35,063	31,251	126	635	2,890	1,279	9	57	160	2
1985	7,301	15,025	2,977	7	3,254	3,418	1,190	<.05	95	149	1
1986	5,243	21,517	1,361	29	4,731	2,530	974	<.05	48	312	2
1987	3,160	23,201	5,724	50	823	1,803	562	2	20	403	2
1988	4,908	19,520	8,863	6	804	1,636	500	1	9	322	3
1989	2,214	17,615	4,505	1	1,019	1,357	504	<.05	17	255	6
1990	3,030	8,509	2,256	2	925	1,236	357	1	31	373	20
1991	1,676	4,178	3,407	7	104	1,029	584	0	32	219	1
1992	4,885	3,350	2,586	7	1,087	1,546	292	<.05	22	142	1
1993	6,151	3,795	4,539	26	559	1,771	275	1	44	122	0
1994	10,686	5,056	2,111	47	916	1,700	330	<.05	37	128	12
1995	6,528	3,038	7,037	49	714	1,161	270	5	31	95	5
1996	14,173	3,347	5,455	62	4,688	1,191	319	1	20	96	1
1997	11,292	4,774	6,070	82	2,251	1,448	319	35	32	132	1
1998	13,785	5,799	5,846	53	1,949	1,378	326	2	11	98	3
1999	9,629	1,353	3,759	105	179	1,992	320	10	5	6	0
2000	9041	1148	780	87	312	2652	295	5	3	80	1
2001	11,183	655	58	53	196	2195	373	2	2	46	2
2002	10,028	544	236	10	11	1697	315	0	0	82	42

Table 2. Annual value ($) of West Coast highly migratory landings by species

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
1982	13,167,979	122,114,308	66,432,060	1,864,472	4,405,204	8,385,654	3,241,669	0	25,192	555,869	30,839
1983	19,142,864	92,971,187	57,729,430	72,202	1,670,878	10,729,636	2,301,209	13,282	142,526	360,974	7,201
1984	26,146,708	56,409,588	37,467,700	264,792	1,395,492	17,701,329	2,485,275	11,649	71,349	287,733	3,572
1985	12,214,354	18,206,638	2,826,414	25,900	4,127,982	19,538,942	2,660,903	843	140,433	283,043	3,319
1986	8,895,672	25,475,289	1,367,387	129,108	6,618,473	18,256,026	2,412,160	277	95,181	611,399	1,886
1987	7,085,992	33,183,108	5,982,568	244,701	2,902,340	15,405,478	1,638,772	2,560	30,721	989,632	2,566
1988	12,280,116	34,161,742	12,618,821	33,772	4,445,064	13,007,930	1,310,935	1,097	13,328	868,676	2,923
1989	4,873,362	24,112,994	5,086,365	3,004	1,684,134	10,579,050	1,202,991	191	31,313	707,408	4,631
1990	6,911,021	10,485,225	2,361,619	10,928	1,433,788	8,811,042	786,534	2,067	42,599	909,368	15,834
1991	3,349,988	4,721,908	3,130,649	50,650	137,612	7,497,271	1,145,001	0	28,944	491,477	892
1992	13,214,373	4,412,452	1,606,563	51,444	1,360,230	8,709,765	521,922	693	17,108	266,344	2,056
1993	13,001,721	6,440,417	3,498,178	238,527	841,129	10,062,551	520,120	509	32,498	248,651	681
1994	22,293,343	4,947,988	1,916,462	336,130	1,834,094	10,504,630	632,555	46	37,579	270,088	17,572
1995	12,377,227	3,260,929	5,125,387	268,465	1,129,006	7,013,279	510,733	9,389	26,730	177,076	2,994
1996	28,583,043	3,388,536	4,185,411	273,321	4,238,678	6,363,798	634,493	1,635	18,591	174,621	616
1997	20,529,493	5,254,042	5,639,463	370,331	2,896,450	6,297,358	609,285	64,543	35,781	232,737	287
1998	19,068,271	5,976,102	5,322,183	277,238	3,058,769	6,052,792	574,795	2,635	9,513	173,349	6,094
1999	17,515,551	1,468,743	2,748,208	639,668	961,423	8,309,539	616,407	18,424	5,876	109,767	83
2000	17,154,639	1,294,388	483,242	579,384	577,095	11,772,245	587,702	2,738	4,636	132,970	909
2001	20,687,195	465,558	33,633	320,855	473,821	8,696,689	595,542	2,767	8,428	75,780	1,501
2002	14,291,939	588,677	128,425	87,304	43,512	6,320,439	517,715	N.A.	N.A.	124,522	18,598

[1]Real values are current values adjusted to eliminate the effects of inflation by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

Table 3. Pacific coast commercial landings of highly migratory species by state, 1982-2001

Landings (mt)

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
Washington											
1982	266	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1983	530	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1984	67	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1985	172	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1986	845	N.A.	0	N.A.	0	0	82	N.A.	N.A.	N.A.	<.05
1987	529	N.A.	0	N.A.	0	0	65	N.A.	N.A.	N.A.	<.05
1988	1,900	N.A.	0	N.A.	0	2	6	N.A.	N.A.	N.A.	<.05
1989	855	N.A.	0	N.A.	0	0	3	N.A.	N.A.	N.A.	0
1990	1,225	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1991	428	N.A.	<.05	N.A.	0	0	<.05	N.A.	N.A.	N.A.	<.05
1992	1,864	N.A.	<.05	N.A.	0	0	1	N.A.	N.A.	N.A.	<.05
1993	2,167	N.A.	0	N.A.	0	1	<.05	N.A.	N.A.	N.A.	<.05
1994	5,377	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1995	3,413	N.A.	0	N.A.	0	<.05	5	N.A.	N.A.	N.A.	<.05
1996	4,969	N.A.	0	N.A.	0	0	4	N.A.	N.A.	N.A.	<.05
1997	3,775	N.A.	0	N.A.	0	0	2	N.A.	N.A.	N.A.	<.05
1998	6,517	N.A.	0	N.A.	0	0	6	N.A.	N.A.	N.A.	<.05
1999	2,074	N.A.	0	N.A.	12	4	65	N.A.	N.A.	N.A.	0
2000	3,185	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<0.5
2001	4,152	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	5,358	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1982	863	<.05	<.05	N.A.	0	0	0	N.A.	N.A.	0	0
1983	1,541	<.05	<.05	N.A.	0	0	0	N.A.	N.A.	0	0
1984	737	<.05	0	N.A.	0	0	0	N.A.	N.A.	0	0
1985	692	0	0	N.A.	0	0	2	N.A.	N.A.	0	0
1986	1,116	<.05	<.05	N.A.	0	0	424	N.A.	N.A.	0	0
1987	1,038	0	0	N.A.	<.05	0	92	N.A.	N.A.	0	0
1988	1,799	0	0	N.A.	0	0	81	N.A.	N.A.	0	0
1989	490	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	0
1990	943	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1991	571	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1992	1,764	0	0	N.A.	0	0	1	N.A.	N.A.	0	<.05
1993	2,157	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1994	2,131	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1995	2,283	<.05	<.05	N.A.	<.05	3	1	N.A.	N.A.	0	<.05
1996	4,059	<.05	0	N.A.	<.05	16	<.05	N.A.	N.A.	0	1
1997	4,158	<.05	<.05	N.A.	1	6	<.05	N.A.	N.A.	0	<.05
1998	4,808	0	0	N.A.	3	35	<.05	N.A.	N.A.	1	2
1999	2,064	<.05	0	N.A.	6	6	1	N.A.	N.A.	<.05	<.05
2000	3,972	0	0	N.A.	0	0	0	N.A.	N.A.	0	1
2001	4,058	0	0	N.A.	0	0	0	N.A.	N.A.	0	2
2002	1,979	0	0	N.A.	0	0	0	N.A.	N.A.	0	<0.5
California											
1982	4,281	61,769	41,904	968	2,404	1,112	1,848	0	28	351	27
1983	7,503	55,740	44,995	21	764	1,758	1,331	9	96	217	7
1984	11,854	35,063	31,251	126	635	2,890	1,279	9	57	160	2
1985	6,437	15,025	2,977	7	3,254	3,418	1,188	<.05	95	149	1
1986	3,282	21,517	1,361	29	4,731	2,530	468	<.05	48	312	2
1987	1,592	23,201	5,724	50	823	1,803	405	2	20	403	2
1988	1,209	19,520	8,863	6	804	1,634	414	1	9	322	3
1989	870	17,615	4,505	1	1,019	1,357	501	<.05	17	255	6
1990	862	8,509	2,256	2	925	1,236	356	1	31	373	20
1991	677	4,178	3,407	7	104	1,029	584	0	32	219	1
1992	1,257	3,350	2,586	7	1,087	1,546	291	<.05	22	142	1
1993	1,827	3,795	4,539	26	559	1,770	275	1	44	122	<.05
1994	3,177	5,056	2,111	47	916	1,700	330	<.05	37	128	12
1995	832	3,038	7,037	49	714	1,159	264	5	31	95	5
1996	5,146	3,347	5,455	62	4,687	1,175	316	1	20	96	<.05
1997	3,358	4,774	6,070	82	2,250	1,442	317	35	32	132	<.05
1998	2,459	5,799	5,846	53	1,946	1,343	319	2	11	97	1
1999	5,491	1,353	3,759	105	161	1,982	253	10	5	62	<.05
2000	1,884	1,148	780	87	312	2,612	250	3	5	80	<0.5
2001	2,972	642	57	53	196	2,194	360	2	2	46	0
2002	2,692	544	236	10	9.7	1,697	315	N.A.	N.A.	82	41

Table 4. Pacific coast real commercial exvessel revenues (1999)[1] from highly migratory species by state, 1982-2001

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
					Revenues ($)						
Washington											
1982	596,514	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	102
1983	1,002,286	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	201
1984	137,861	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	11
1985	292,000	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	183
1986	1,348,513	N.A.	0	N.A.	0	0	303,270	N.A.	N.A.	N.A.	170
1987	1,160,514	N.A.	0	N.A.	0	0	298,466	N.A.	N.A.	N.A.	580
1988	4,666,429	N.A.	0	N.A.	0	13,526	31,385	N.A.	N.A.	N.A.	65
1989	1,730,680	N.A.	0	N.A.	0	0	10,541	N.A.	N.A.	N.A.	0
1990	2,693,806	N.A.	0	N.A.	0	0	33	N.A.	N.A.	N.A.	0
1991	818,179	N.A.	17	N.A.	0	0	287	N.A.	N.A.	N.A.	52
1992	5,014,569	N.A.	82	N.A.	0	0	655	N.A.	N.A.	N.A.	39
1993	4,603,209	N.A.	0	N.A.	0	5,907	953	N.A.	N.A.	N.A.	34
1994	10,609,267	N.A.	0	N.A.	0	0	102	N.A.	N.A.	N.A.	0
1995	6,429,656	N.A.	0	N.A.	0	328	16,541	N.A.	N.A.	N.A.	16
1996	9,515,982	N.A.	0	N.A.	0	0	11,619	N.A.	N.A.	N.A.	44
1997	7,000,641	N.A.	0	N.A.	0	0	10,922	N.A.	N.A.	N.A.	10
1998	8,962,842	N.A.	0	N.A.	0	0	19,243	N.A.	N.A.	N.A.	71
1999	3,637,282	N.A.	0	N.A.	27,772	9,445	144,232	N.A.	N.A.	N.A.	0
2000	5,837,871	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	9
2001	7,951,774	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	7,441,030	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1982	2,073,809	233	164	N.A.	0	0	0	N.A.	N.A.	0	0
1983	2,961,338	118	13	N.A.	0	0	0	N.A.	N.A.	0	0
1984	1,367,247	277	0	N.A.	0	0	0	N.A.	N.A.	0	0
1985	1,204,367	0	0	N.A.	0	0	3,064	N.A.	N.A.	0	0
1986	1,891,052	173	4	N.A.	0	0	874,406	N.A.	N.A.	0	0
1987	2,319,249	0	0	N.A.	9	0	214,998	N.A.	N.A.	0	0
1988	4,444,898	0	0	N.A.	0	0	180,477	N.A.	N.A.	0	0
1989	1,142,060	0	0	N.A.	0	0	19	N.A.	N.A.	0	0
1990	2,167,028	0	0	N.A.	0	0	664	N.A.	N.A.	0	69
1991	1,166,314	0	0	N.A.	0	0	0	N.A.	N.A.	0	73
1992	4,554,091	0	0	N.A.	0	0	1,228	N.A.	N.A.	0	99
1993	4,350,334	0	0	N.A.	0	0	498	N.A.	N.A.	0	130
1994	4,103,617	0	0	N.A.	0	0	0	N.A.	N.A.	0	93
1995	4,332,302	336	9	N.A.	454	25,141	1,681	N.A.	N.A.	0	192
1996	7,801,152	9	0	N.A.	1,203	125,422	234	N.A.	N.A.	0	438
1997	7,567,729	536	424	N.A.	3,332	51,790	199	N.A.	N.A.	0	209
1998	6,665,217	0	0	N.A.	15,783	263,820	114	N.A.	N.A.	2,726	5,628
1999	3,782,057	198	0	N.A.	38,117	46,955	2,588	N.A.	N.A.	787	48
2000	7,487,569	0	0	N.A.	0	0	1,190	N.A.	N.A.	0	529
2001	7,544,089	0	0	N.A.	0	0	0	N.A.	N.A.	0	1,211
2002	2,951,707	0	0	N.A.	0	0	0	N.A.	N.A.	0	244
California											
1982	10,497,656	122,114,075	66,431,896	1,864,472	4,405,204	8,385,654	3,241,669	0	25,192	555,869	30,736
1983	15,179,240	92,971,069	57,729,417	72,202	1,670,878	10,729,636	2,301,209	13,282	142,526	360,974	7,001
1984	24,641,599	56,409,311	37,467,700	264,792	1,395,492	17,701,329	2,485,275	11,649	71,349	287,733	3,561
1985	10,717,987	18,206,638	2,826,414	25,900	4,127,982	19,538,942	2,657,839	843	140,433	283,043	3,136
1986	5,656,107	25,475,116	1,367,383	129,108	6,618,473	18,256,026	1,234,483	277	95,181	611,399	1,716
1987	3,606,229	33,183,108	5,982,568	244,701	2,902,331	15,405,478	1,125,308	2,560	30,721	989,632	1,986
1988	3,168,789	34,161,742	12,618,821	33,772	4,445,064	12,994,405	1,099,073	1,097	13,328	868,676	2,858
1989	2,000,622	24,112,994	5,086,365	3,004	1,684,134	10,579,050	1,192,430	191	31,313	707,408	4,631
1990	2,050,187	10,485,225	2,361,619	10,928	1,433,788	8,811,042	785,836	2,067	42,599	909,368	15,765
1991	1,365,494	4,721,908	3,130,632	50,650	137,612	7,497,271	1,144,714	0	28,944	491,477	767
1992	3,645,713	4,412,452	1,606,481	51,444	1,360,230	8,709,765	520,038	693	17,108	266,344	1,918
1993	4,048,179	6,440,417	3,498,178	238,527	841,129	10,056,643	518,669	509	32,498	248,651	517
1994	7,580,459	4,947,988	1,916,462	336,130	1,834,094	10,504,630	632,452	46	37,579	270,088	17,479
1995	1,615,269	3,260,593	5,125,378	268,465	1,128,552	6,987,810	492,511	9,389	26,730	177,076	2,785
1996	11,265,909	3,388,527	4,185,411	273,321	4,237,475	6,238,375	622,640	1,635	18,591	174,621	135
1997	5,961,123	5,253,506	5,639,039	370,331	2,893,118	6,245,568	598,164	64,543	35,781	232,737	67
1998	3,440,213	5,976,102	5,322,183	277,238	3,042,986	5,788,972	555,437	2,635	9,513	170,623	395
1999	10,102,663	1,468,544	2,748,208	639,668	895,534	8,253,140	469,587	18,424	5,876	108,980	35
2000	3,829,200	1,294,388	483,242	579,384	576,439	11,770,080	485,073	2,736	4,636	136,698	294
2001	5,191,333	445,861	32,878	320,753	472,785	8,695,855	584,636	2,767	8,428	75,572	0
2002	3,899,203	588,677	128,245	87,304	33,148	6,320,439	517,427	N.A.	N.A.	124,522	18,351

[1]Real values are current values adjusted to eliminate the effects of inflation by dividing current values by the current year GDP implicit price deflator, with a base year of 1999

Appendix 8

Honolulu Laboratory

At the Southwest Fisheries Science Center's Honolulu Laboratory, scientists assess and investigate the dynamics of various tuna and billfish species in the central Pacific Ocean as well as Pacific island resources such as bottomfish, lobster, deep sea shrimp, and other fishery resources associated with deep-sea seamounts. This work contributes to basic fisheries science and supports the Western Pacific Regional Fishery Management Council. Honolulu Laboratory scientists conduct research and recovery work on the threatened green sea turtle and the endangered Hawaiian monk seal and increasingly have focused on issues concerning fisher-protected species interactions. Staff scientists study the effects of environmental changes and human activities on fisheries and marine animal habitats and ecosystems and there is a new research emphasis oriented towards coral reef ecosystems.

This research collectively supports two primary goals of NMFS: to build sustainable fisheries and to recover protected species. These goals support the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act. Geographic areas of study are wide ranging, from the mid-Pacific pelagic oceanic environment, to the Northwestern Hawaiian Islands and the main Hawaiian Islands, to other central and western Pacific islands, including American Samoa, Guam, and the Northern Mariana Islands. Key programs include ecosystem and environment, stock assessment, fish biology and ecology, fishery management and performance, and protected species.

The following list of publication (both formal and informal) summarizes the basic science and statistics work pertaining to pelagic fisheries and related issues conducted by the Honolulu Laboratory over the past year.

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Appendix 9

The Pelagic Fisheries Research Program

The Pelagic Fisheries Research Program (PFRP) was established in 1992 after the Magnuson Fishery Conservation and Management Act (1976) was amended to include "highly migratory fish." The PFRP was created to provide scientific information on pelagic fisheries to the Council for use in development of fisheries management policies

The PFRP is located at the Joint Institute for Marine and Atmospheric Research (JIMAR), under the University of Hawaii's School of Ocean and Earth Science and Technology (SOEST). The first PFRP projects were established in late 1993, and work on these projects began in 1994. In order for the Council to determine "optimum use" of these valuable fishery resources, information is required from a broad spectrum of research disciplines, e.g., biology, genetics, statistics, socio-cultural. The PFRP has funded more than 75 research projects and solicits for new research proposals as federal funding permits. Most project investigators are affiliated with regional research institutes, such as the National Marine Fisheries Service (NMFS), Secretariat of the Pacific Community (SPC), and other universities.

Research Projects Funded in 2002:

Biology projects:

Hawaii Regional Tuna Tagging Project
Population Biology of Pacific Oceanic Sharks
Developing Methods to Assess Sex and Maturational Stage of Bigeye Tuna (*Thunnus obesus*) and Swordfish (*Xiphias gladius*)
Distributions, Histories, and Recent Catch Trends with Six Fish Taxa Taken as Incidental Catch by the Hawai'i-based Commercial Longline Fishery
Pop-Off Satellite Archival Tags to Chronicle the Survival and Movements of Blue Shark Following Release from Longline Gear
Developing Biochemical and Physiological Predictors of Long Term Survival in Released Blue Sharks and Sea Turtles
Survivorship, Migrations, and Diving Patterns of Sea Turtles Released from Commercial Longline Fishing Gear, Determined with Pop-Up Satellite Archival Transmitters
Trophic Ecology and Structured-Associated Aggregation Behavior in Bigeye and Yellowfin Tuna in Hawaiian Waters
Investigating the Life History and Ecology of Opah and Monchong
Workshop on How to Improve Studies on the Collective Behavior of Pelagic Fish
Describing the Vertical Habitat of Bigeye and Albacore Tunas and Post Release Survival for Marlins in the Central Pacific Longline Fisheries with Pop-Up Archival Transmitting Tags
Ecological Characterization of American Samoa's Small-Scale Alia Albacore Longline Fishery
Evaluating Biochemical and Physiological Predictors of Long Term Survival in Released Pacific Blue Marlin Tagged with Pop-Up Satellite Archival Transmitters (PSATs)
Instrumented Buoys as Autonomous Observatories of Pelagic Ecosystems

Economics projects

Economic Fieldwork on Pelagic Fisheries in Hawaii
Analysis of Alternatives for Participation in International Management of Pelagic Fisheries
Analyzing the Technical and Economic Structure of Hawaii's Pelagic Fishery
Regulatory Impact Analysis Framework for Hawaii Pelagic Fishery Management
Recreational Fisheries Meta Data - Preliminary Steps
Incidental Catch of Non-target Fish Species and Sea Turtles: Comparing Hawaii's Pelagic Longline Fishery against Others
A Sociological Baseline of Hawaii's Longline Fishery
Modeling Longline Effort Dynamics and Protected Species Interaction

Oceanography projects

The Role of Oceanography in Bigeye Tuna Aggregation and Vulnerability in the Hawaii Longline Fishery from Satellite, Moored and Shipboard Time Series
Development of Oceanographic Atlases for Pelagic and Insular Fisheries and Resource Management of the Pacific Basin
Trophic Structure and Tuna Movement in the Cold Tongue-Warm Pool Pelagic Ecosystem of the Equatorial Pacific
Oceanographic Characterization of the American Samoa Longline Fishing Grounds for Albacore, *Thunnus al*

Protected Species projects

A General Bayesian Integrated Population Dynamics Model for Protected Species
Integrated Statistical Model for Hawaiian Albatross Populations
Development of a Hierarchical Model to Estimate Sea Turtle Rookery Contributions to Mixed Stocks in Foraging Habitats
Direct Tests of the Efficacy of Bait and Bear Modifications for Reducing Interactions of Sea Turtles with Longline Fishing Gear in Costa Rica

Statistics and Modeling projects

Pelagic Fisheries Research Program, Modeling Portion (2040)
Mixed Resolution Models for Investigating Individual to Population Scale Spatial Dynamics
Comparisons of Catch Rates for Target and Incidentally Taken Fishes in Widely Separated Areas of the Pacific Ocean
Causes of Rapid Declines in World Billfish Catch Rates
Pacific-wide analysis of bigeye tuna using length-based, age-structured modeling framework (MULTIFAN-C
Incorporating Oceanographic Data in Stock Assessment of Blue Sharks and Other Species Incidentally Caught in the Hawaii-Based Longline Fishery

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Adam, M.S. Population dynamics of the bigeye tuna in Hawaii's pelagic fisheries. Presentation at the 132nd American Fishery Society Annual Meeting, Maryland, Baltimore, August 18-22, 2002.

Adam, M.S. Analysis of Hawaii Tuna Tagging Project Data. Presentation at the 15th Standing Committee on Tunas and Billfish Meeting (SCTB 15), Honolulu, Hawaii, July 22-27, 2002.

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Appendix 10

GLOSSARY — PELAGICS

TERM	DEFINITION
Alia	Samoan fishing catamaran, about 30 feet long, constructed of aluminum or wood with fiberglass. Used for various fisheries including trolling, longline, and bottomfishing
AP	Advisory Panel. Appointed industry/government/educational representatives functioning in an advisory capacity to the Council.
AS	American Samoa. Includes the islands of Tutuila, Manua, Rose and Swains Atolls.
ASDPW	Department of Public Works, American Samoa. Also, DPW.
Bycatch	Fish caught in a fishery but discarded or released, except in a recreational fisheries catch and release program.
Commercial	Commercial fishing, where the catch is intended to be sold, bartered, or traded.
CNMI	Commonwealth of the Northern Mariana Islands. Also, Northern Mariana Islands, Northern Marianas, and NMI. Includes the islands of Saipan, Tinian, Rota, and many others in the Marianas Archipelago.
CPUE	Catch-Per-Unit-Effort. A standard fisheries index usually expressed as numbers of fish caught per unit of gear per unit of time, eg., number of fish per hook per line-hour or number of fish per 1,000 hooks. The term catch rate is sometimes used when data are insufficiently detailed to calculate an accurate CPUE.
DAWR	Division of Aquatic & Wildlife Resources, Territory of Guam.
DBEDT	Department of Business, Economic Development & Tourism, State of Hawaii.
DFW	Division of Fish & Wildlife, Northern Mariana Islands.
DLNR	Department of Land & Natural Resources, State of Hawaii. Parent agency for Division of Aquatic Resources (HDAR).
DMWR	Department of Marine & Wildlife Resources, American Samoa. Also, MWR.
EEZ	Exclusive Economic Zone, refers to the sovereign waters of a nation, recognized internationally under the United Nations Convention on the Law of the Sea as extending out 200 nautical miles from shore. Within the U.S., the EEZ typically is between three and 200 nautical miles from shore.
ESA	Endangered Species Act. An Act of Congress passed in 1966 that establishes a federal program to protect species of animals whose survival is threatened by habitat destruction, overutilization, disease etc.
FAD	Fish Aggregating Device; a raft or pontoon, usually tethered, and under which, pelagic fish will concentrate.
FDCC	Fishery Data Coordinating Committee, WPRFMC.
FFA	Forum Fisheries Agency. An agency of the South Pacific Forum, which comprises the independent island states of the South Pacific, Australia and New Zealand. The FFA formed to negotiated access agreements between FFA member countries and distant water fishing nations such as Japan and the USA.
FMP	Fishery Management Plan.
Guam	A U.S. territory in the Marianas Archipelago. South of and adjacent to the Commonwealth of

Hawaii	U.S. state. See MHI, NWHI. Composed of the islands, atolls and reefs of the Hawaiian Archipelago from Hawai'i to Kure Atoll, except Midway Islands. Capitol - Honolulu.
HDAR	Hawaii Division of Aquatic Resources. Also, DAR.
HIMB	Hawaii Institute of Marine Biology, University of Hawaii.
HURL	Hawaii Undersea Research Lab.
JIMAR	Joint Institute of Marine and Atmospheric Research, University of Hawaii.
IATTC	Inter-American Tropical Tuna Commission.
Ika-shibi	Hawaiian term for nigh tuna handline fishing method. Fishing for tuna using baited handlines at night with a nightlight and chumming to attract squid and tuna.
Incidental Catch	Fish caught that are retained in whole or part, though not necessarily the targeted species. Examples include monchong, opah and sharks.
Interaction	Catch of protected species, which is required to be released. Examples: Hawaiian monk seals, marine turtles and albatrosses.
Logbook	Journal kept by fishing vessels for each fishing trip; records catch data, including bycatch and incidental catch. Required in the federally regulated longline and crustacean fisheries in the Hawaiian EEZ.
Longline	Fishing method utilizing a horizontal mainline stretching from several hundred yards to many miles in length, suspended for the surface by floats, to which droppers with baited hooks are attached.
Longliner	Fishing vessel specifically adapted to use the longline fishing method.
MFCMA	Magnuson Fishery Conservation and Management Act of 1976. Also, Magnuson-Stevens Fishery Conservation and Management Act of 1996. Sustainable Fisheries Act.
MHI	Main Hawaiian Islands (comprising the islands of Hawai'i, Mau'i, Lana'i, Moloka'i, Kaho'olawe, O'ahu, Kauai', Ni'ihau and Ka'ula).
MSY	Maximum Sustainable Yield.
NMFS	National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce. Also NOAA Fisheries.
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce.
NWHI	Northwestern Hawaiian Islands. All islands in the Hawaiian Archipelago, other than the Main Hawaiian Islands (MHI).
OFP	Oceanic Fisheries Program of the South Pacific Commission.
OY	Optimum Yield.
Palu-ahi	Hawaiian term for day tuna handline fishing. Fishing for tuna using baited handlines and chumming with cut bait in a chum bag or wrapped around a stone. Also, drop-stone, make-dog, etc.
PAO	Pacific Area Office, National Marine Fisheries Service. Also, NMFS/PAO.
Pelagic	The pelagic habitat is the upper layer of the water column from the surface to the thermocline. The pelagic species include all commercially targeted highly migratory species such as tuns, billfish and some incidental-catch species such as sharks, as well as coastal pelagic species such as akule and opelu.
PFRP	Pacific Pelagic Fisheries Research Program, JIMAR, University of Hawaii. Also PPFRP.

PMUS	Pacific Pelagic Management Unit Species. Also, PPMUS. Species managed under the Pelagics FMP.
Pole-and-Line	Fishing for tuna using poles and fixed leaders with barbless lures and chumming with live baitfish. Poles can be operated manually or mechanically. Also, fishing vessels called baitboats or aku-boats (Hawaii).
Protected	Refers to species which are protected by federal legislation such as the Endangered Species Act, Marine Mammal Protection Act, and Migratory Bird Treaty Act. Examples: Black-footed and Laysan albatrosses, marine turtles, dolphins.
PT or PPT	Pelagic Plan Team. Advisory body to the Council composed of scientists and fishermen who monitor and manage the fisheries under the jurisdiction of the Pelagics FMP.
Purse seine	Fishing for tuna by surrounding schools of fish with a very large net and trapping them by closing the bottom of the net.
Recreational	Recreational fishing for sport or pleasure, where the catch is not sold, bartered or traded.
SAFE	Stock Assessment and Fishery Evaluation, NMFS.
Sanctuary	Protected area. Commercial/recreational fishing may be restricted.
Secretary	When capitalized and used in reference to fisheries within the U.S. EEZs, it refers to the U. S. Secretary of Commerce.
Small pelagics	Species such as akule (big-eye scad - *Selar* spp.) And opelu (mackerel scad - *Decapterus* spp). These fish occur mainly in shallow inshore waters but may also be found in deeper offshore waters. Not part of the PMUS.
SPC	South Pacific Commission. A technical assistance organization comprising the independent island states of the tropical Pacific Ocean, dependant territories and the metropolitan countries of Australia, New Zealand, USA, France and Britain.
SPR	Spawning Potential Ratio. A term for a method to measure the effects of fishing pressure on a stock by expressing the spawning potential of the fished biomass as a percentage of the unfished virgin spawning biomass. Stocks are deemed to be overfished when the SPR<20%.
SSC	Scientific & Statistical Committee, an advisory body to the Council comprising experts in fisheries, marine biology, oceanography, etc.
Trolling	Fishing by towing lines with lures or live-bait from a moving vessel.
USCG	U.S. Coast Guard, 14th District, Department of Transportation.
USFWS	U.S. Fish & Wildlife Service, Department of Interior. Also, FWS.
VMS	Vessel Monitoring System. A satellite based system for locating and tracking fishing vessels. Fishing vessels carry a transponder which can be located by overhead satellites. Two-way communication is also possible via most VMS systems.
WPacFIN	Western Pacific Fishery Information Network, NMFS.
WPRFMC	Also, the Council. Western Pacific Regional Fishery Management Council. One of eight nationwide fishery management bodies created by the Magnuson Fisheries Conservation and Management Act pf 1976 to develop and manage domestic fisheries in the U.S. EEZ. Composed of American Samoa, Guam, Hawaii, and Commonwealth of Northern Mariana Islands.